Title: Introduction to Complex Analysis/Computer Skills - Lecture 4C

Date: Sep 02, 2010 11:15 AM

URL: http://pirsa.org/10090091

Abstract:

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$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[93]:=
```
fr = FindRoot[eqs, vars];
```

```
eqs /. fr // Chop; (* check of equations *)
```

$$\text{lp} = \left\{\frac{x[\#+1] + x[\#]}{2},\ \frac{1}{x[\#+1] - x[\#]}\right\} \ \&\ /@\ \text{Range}[M-1]\ /.\ \text{fr}\ //\ \text{ListPlot};$$

$$\text{lp} = \text{Table}\left[\left\{\frac{x[j+1] + x[j]}{2},\ \frac{1}{x[j+1] - x[j]}\right\},\ \{j,\ 1,\ M-1\}\right]\ /.\ \text{fr}\ //\ \text{ListPlot};$$

In[99]:=

$$\text{pl} = \text{Plot}\left[\frac{\sqrt{2M - x^2}}{\pi},\ \left\{x,\ -\sqrt{2M},\ \sqrt{2M}\right\},\ \text{PlotStyle} \to \text{Red}\right]$$

In[100]:=
```
Show[pl, lp]
```

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Show[pl, lp]
```

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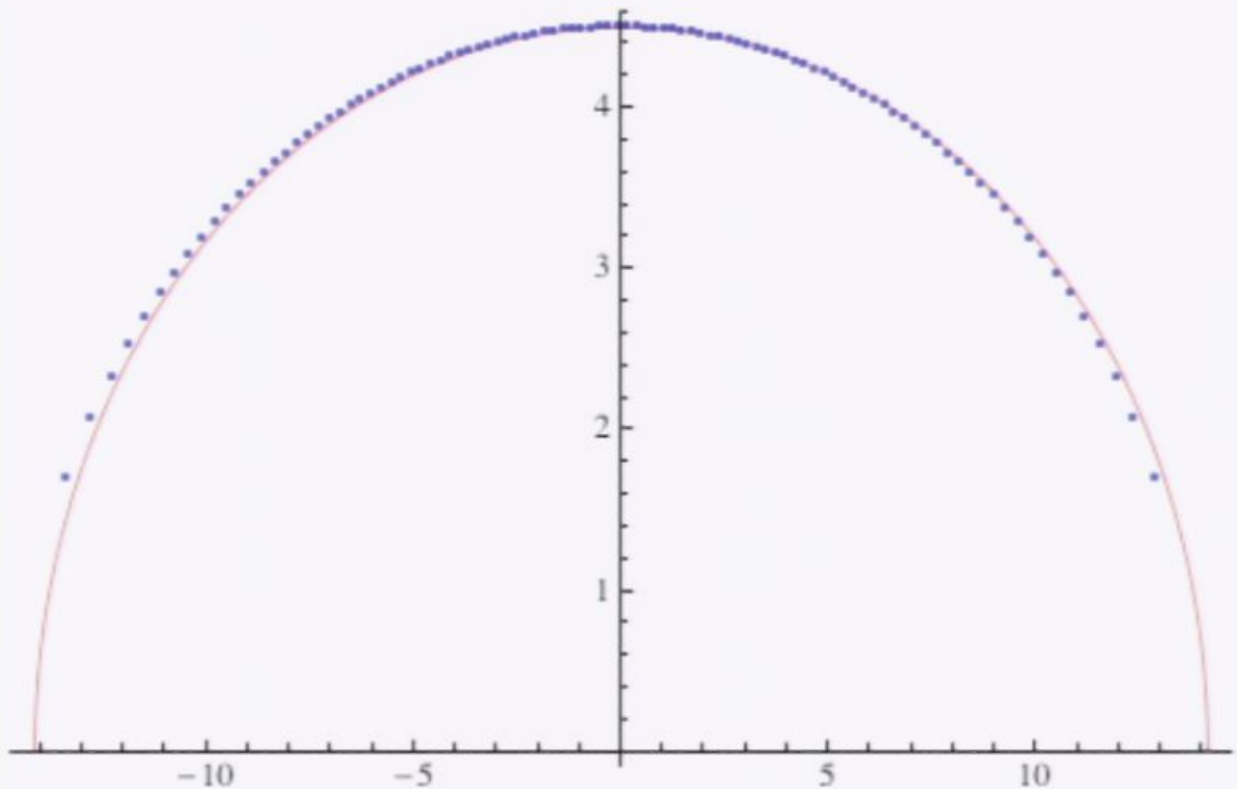
In[104]:=

```
Show[pl, lp]
```

Out[104]=



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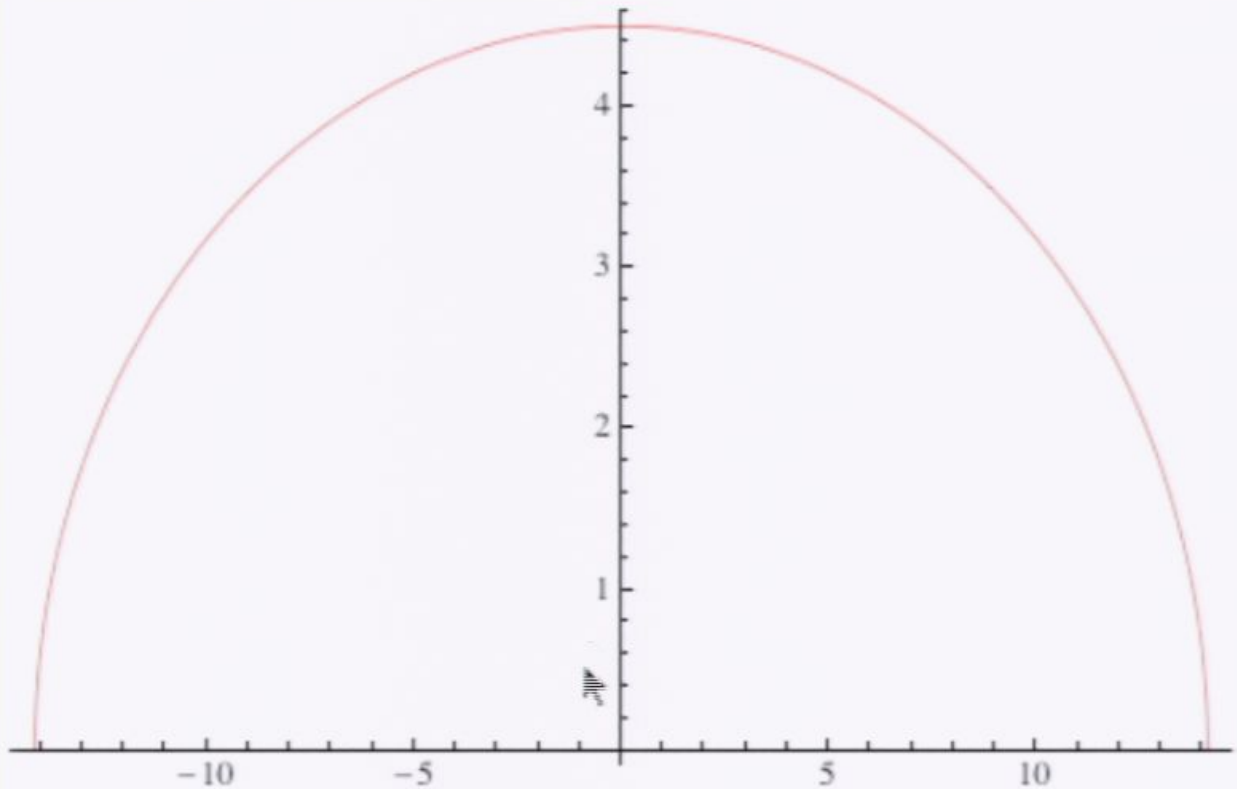
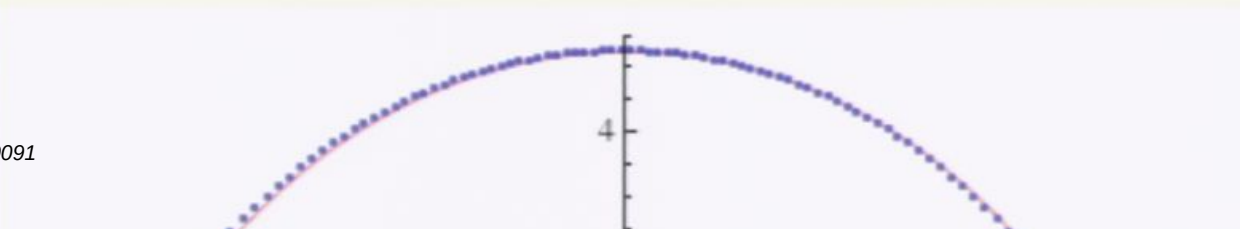
Out[103]=



In[104]:=

```
Show[pl, lp]
```



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pl = Plot[Sqrt[2 M - x^2]/π, {x, -Sqrt[2 M], Sqrt[2 M]}, PlotStyle → Red]
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In[104]:=
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Show[pl, lp]
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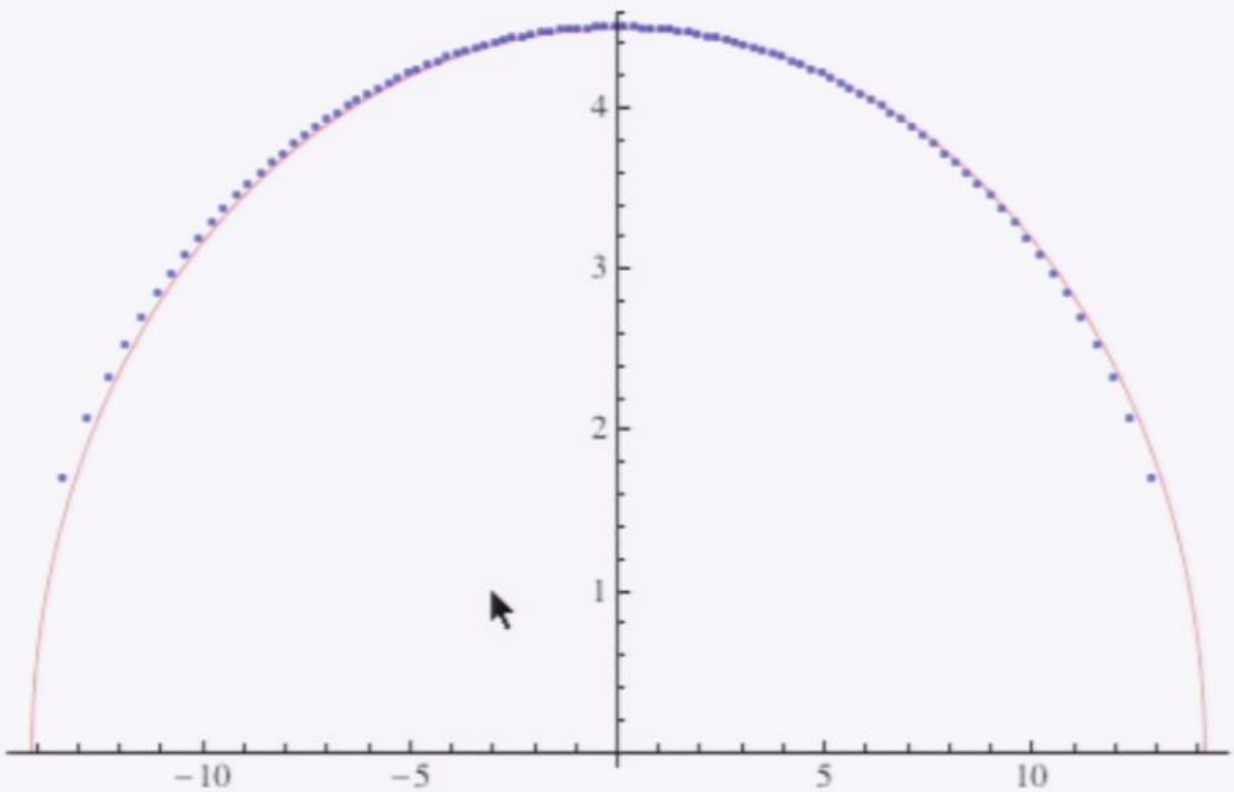
Out[104]=



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k=1 [ x[#] - x[k] ]
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Show[pl, lp]
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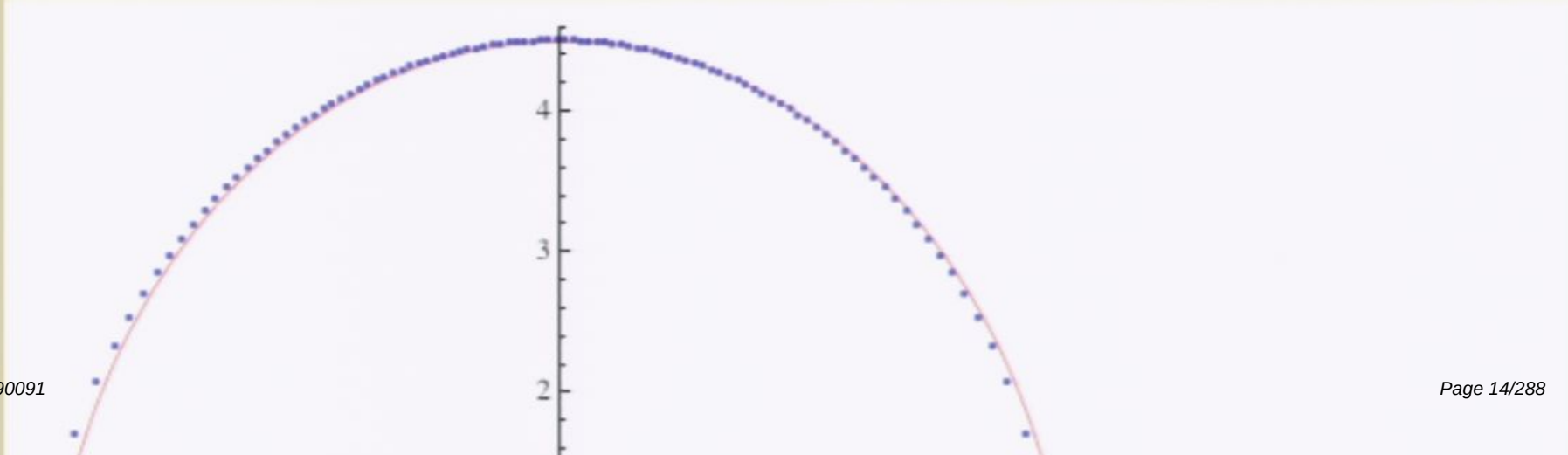

Out[104]=

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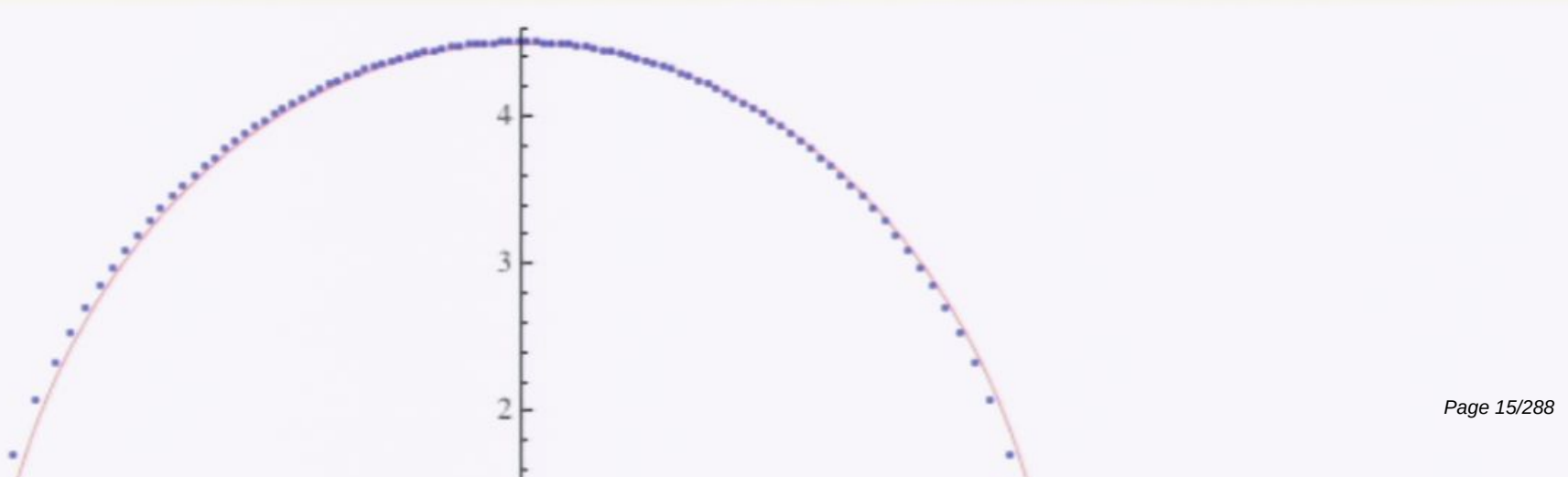
In[104]:=

```
Show[pl, lp]
```

Out[104]=



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In[107]:=

```
pl = Plot[Sqrt[2 M - x^2]/π, {x, -Sqrt[2 M], Sqrt[2 M]}, PlotStyle → Red]
```

Out[107]=

In[104]:=

```
Show[pl, lp]
```

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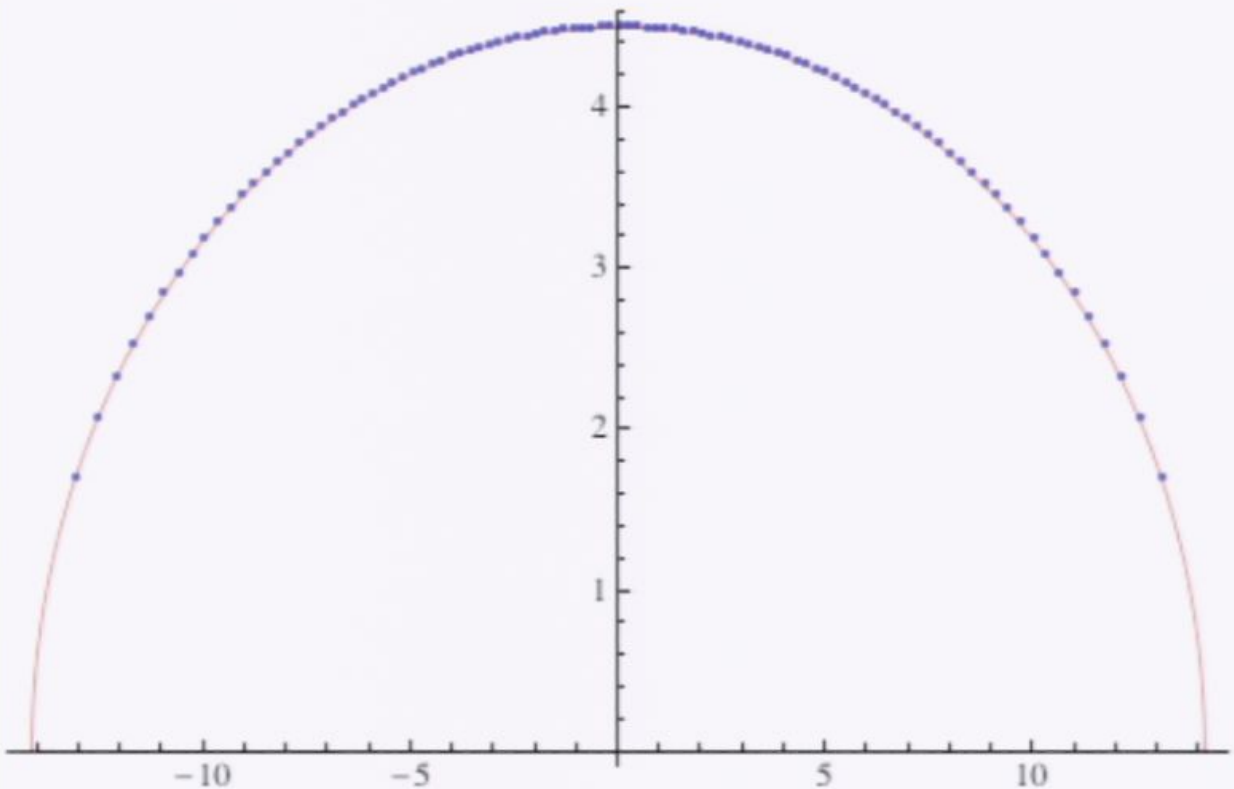
thursday.nb

In[108]:=

```
Show[pl, lp]
```

Out[108]=



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In[108]:=
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Live version

In[88]:=
```
M = 100;
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In[89]:=
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vars = Table[{x[j], j - M / 2}, {j, M}];
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$$\text{eqs} = \text{Table}\left[x[j] - \sum_{k=1}^{M} \text{If}\left[k == j,\ 0,\ \frac{1}{x[j] - x[k]}\right],\ \{j,\ 1,\ M\}\right];$$

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thursday 2.nb

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thursday 2.nb

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thursday 2.nb

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In[1[illegible]]:=
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Show[pl, lp]
```

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thursday 2.nb

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In[108]:=
```
Show[pl, lp]
```

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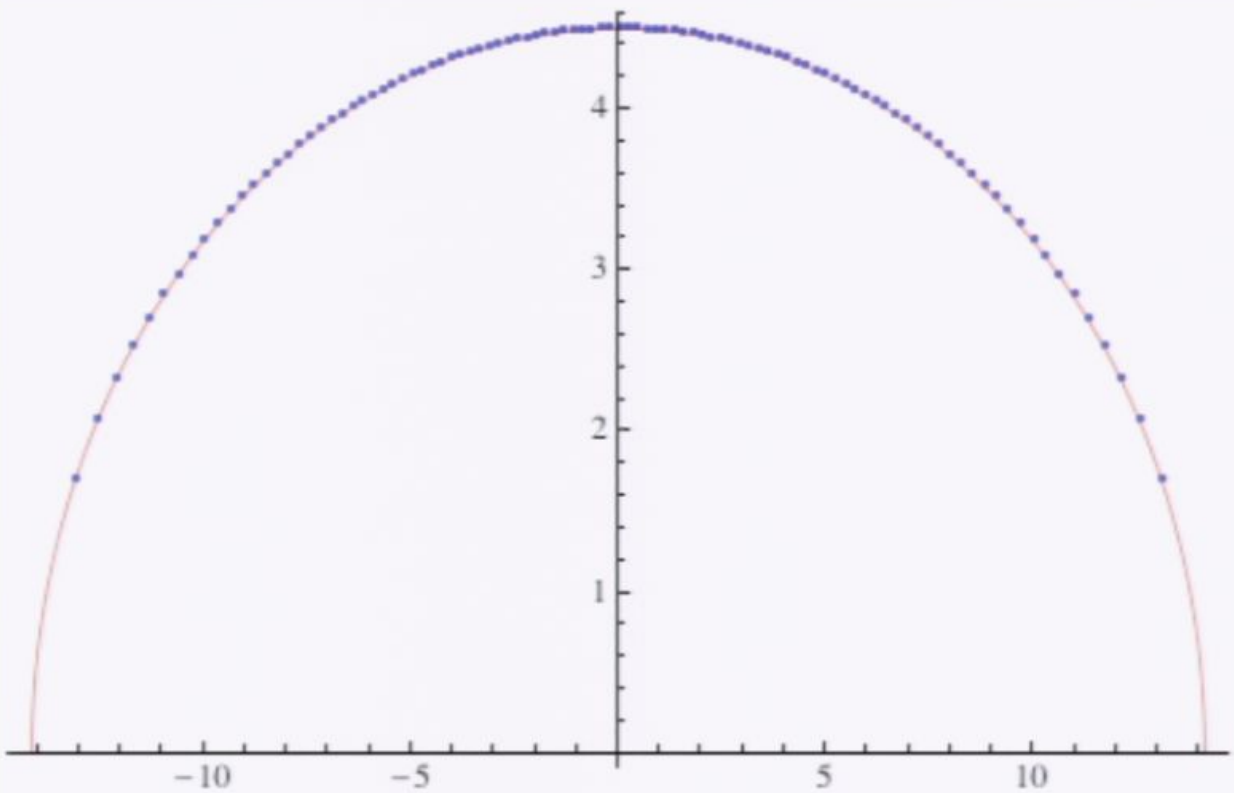
thursday 2.nb

```
pl = Plot[Sqrt[2 M - x^2]/π, {x, -Sqrt[2 M], Sqrt[2 M]}, PlotStyle → Red];
```

In[113]:=

```
Show[pl, lp]
```

Out[113]=



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thursday 2.nb

Live version

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Show[pl, lp]
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thursday 2.nb

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thursday 2.nb

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Check of density

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- Check of density
- Harmonic Oscillator

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- Check of density
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- Check of density
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thursday 2.nb

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Solving th

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vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[93]:=
```
fr = FindRoot[eqs, vars];
```

In[110]:=
```
eqs /. fr // Chop; (* check of equations *)
```

Check of density

In[111]:=

$$\text{lp} = \left\{\frac{x[\#+1] + x[\#]}{2},\ \frac{1}{x[\#+1] - x[\#]}\right\} \ \&\ /@\ \text{Range}[M-1]\ /.\ \text{fr}\ //\ \text{ListPlot};$$

$$\text{pl} = \text{Plot}\left[\frac{\sqrt{2M - x^2}}{\pi},\ \left\{x,\ -\sqrt{2M},\ \sqrt{2M}\right\},\ \text{PlotStyle} \to \text{Red}\right];$$

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thursday 2.nb

```
M = 100;
```

Solving the equations

```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[93]:=
```
fr = FindRoot[eqs, vars];
```

In[110]:=
```
eqs /. fr // Chop; (* check of equations *)
```

Check of density

In[111]:=

$$\text{lp} = \left\{\frac{x[\#+1] + x[\#]}{2},\ \frac{1}{x[\#+1] - x[\#]}\right\} \ \&\ /@\ \text{Range}[M-1]\ /.\ \text{fr}\ //\ \text{ListPlot};$$

$$\text{pl} = \text{Plot}\left[\frac{\sqrt{2M - x^2}}{\pi},\ \left\{x,\ -\sqrt{2M},\ \sqrt{2M}\right\},\ \text{PlotStyle} \to \text{Red}\right];$$

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thursday 2.nb

```
M = 100;
```

Solving the equations

```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[93]:=
```
fr = FindRoot[eqs, vars];
```

In[110]:=
```
eqs /. fr // Chop; (* check of equations *)
```

Check of density

Hermite Polynomials

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thursday 2.nb

Live version

```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials

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thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

- Solving the equations

```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[93]:=
```
fr = FindRoot[eqs, vars];
```

In[110]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials

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Running...thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

- Solving the equations

In[115]:=
```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[117]:=
```
fr = FindRoot[eqs, vars];
```

In[110]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials

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Running...thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

- Solving the equations

In[115]:=
```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[117]:=
```
fr = FindRoot[eqs, vars];
```

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

```
In[118]:= eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials

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thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

Solving the equations

In[115]:=
```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[117]:=
```
fr = FindRoot[eqs, vars];
```

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

Check of density

Hermite Polynomials

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials

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thursday 2.nb

In[114]:=
```
M = 100;
```

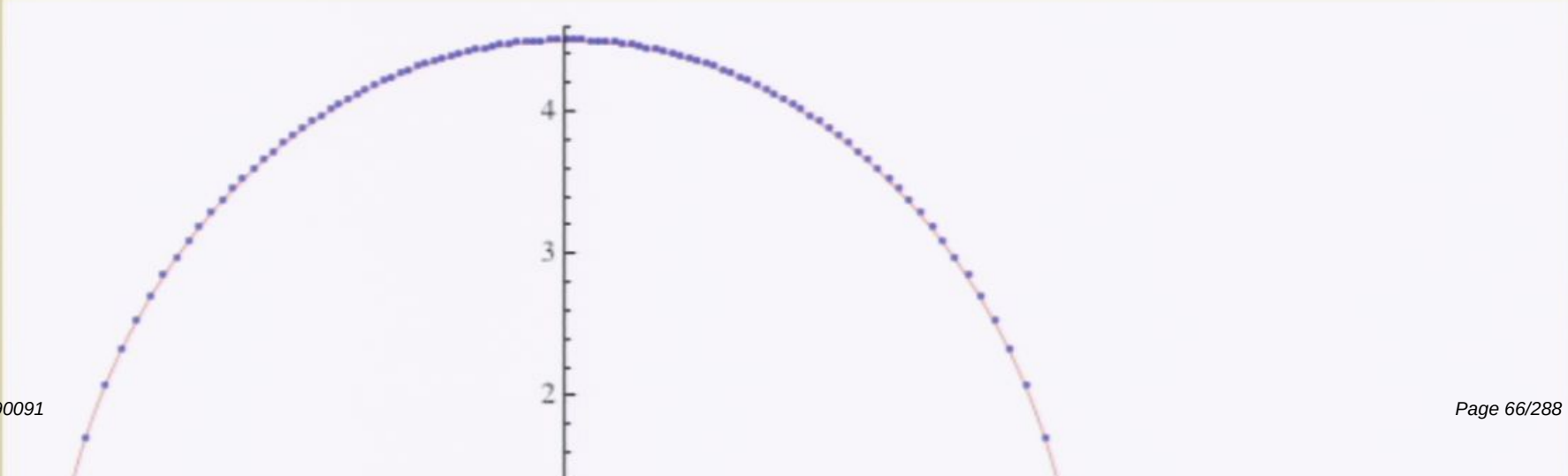
- Solving the equations
- Check of density

In[111]:=
```
lp = {(x[# + 1] + x[#])/2, 1/(x[# + 1] - x[#])} & /@ Range[M - 1] /. fr // ListPlot;

pl = Plot[Sqrt[2 M - x^2]/π, {x, -Sqrt[2 M], Sqrt[2 M]}, PlotStyle → Red];
```

In[113]:=
```
Show[pl, lp]
```

Out[113]=



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thursday 2.nb

```
pl = Plot[Sqrt[2 M - x^2]/π, {x, -Sqrt[2 M], Sqrt[2 M]}, PlotStyle → Red];
```

In[122]:=

```
Show[pl, lp]
```

Out[122]=

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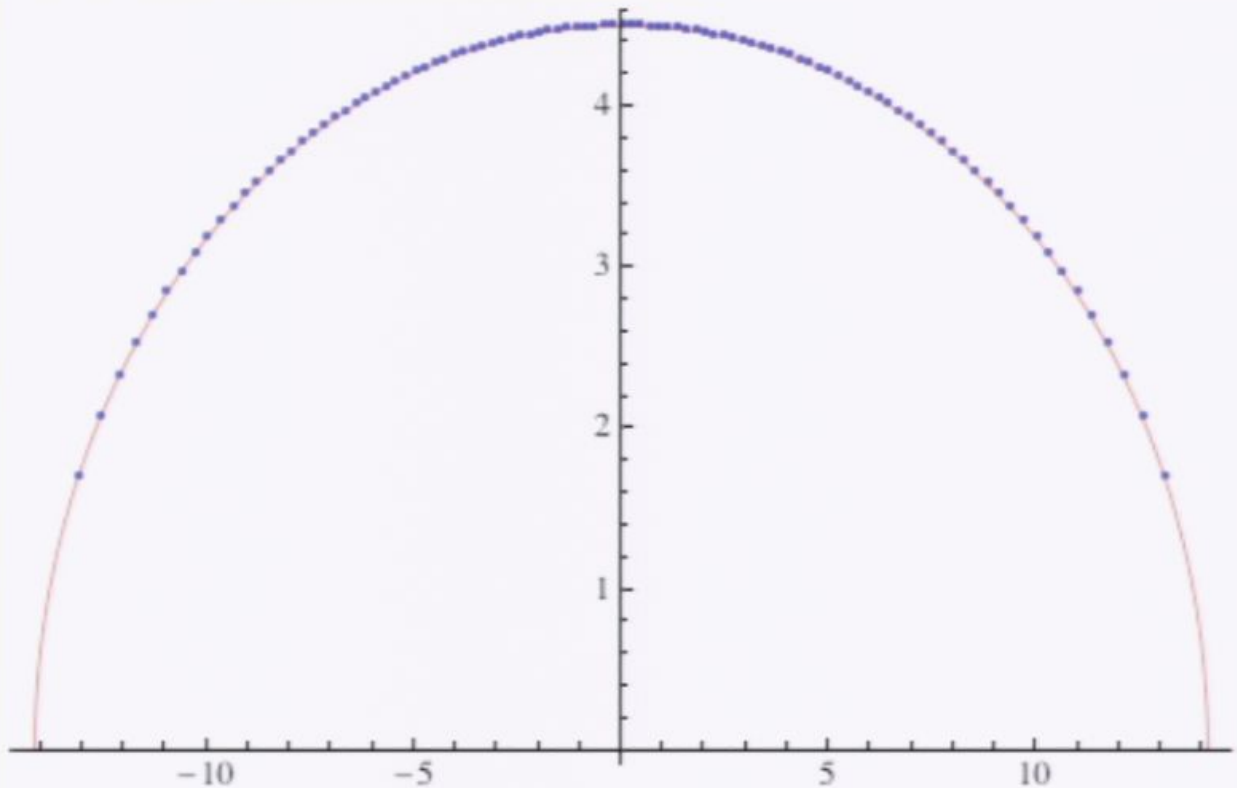
thursday 2.nb

Out[122]=



In[58]:=

```
g /@ {1, 2, 3}
g@{1, 2, 3}
```

Out[58]=

```
{g[1], g[2], g[3]}
```

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thursday 2.nb

In[58]:=
```
g /@ {1, 2, 3}
g@{1, 2, 3}
```

Out[58]=
```
{g[1], g[2], g[3]}
```

Out[59]=
```
g[{1, 2, 3}]
```

Hermite Polynomials

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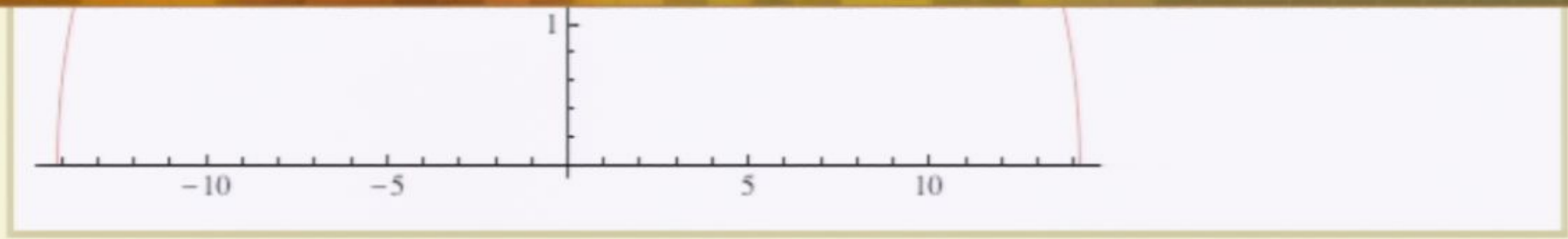
thursday 2.nb



- **Hermite Polynomials**

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thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials

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thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials

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thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials

```
HermiteH[M, x]
```

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thursday 2.nb

$$000\,000\,x^{72} -$$
$$855\,839\,953\,154\,276\,787\,645\,462\,529\,649\,990\,521\,691\,665\,666\,441\,683\,664\,896\,000\,000\,x^{74} +$$
$$7\,807\,662\,730\,530\,244\,378\,520\,009\,042\,420\,966\,162\,801\,160\,465\,783\,780\,802\,560\,000\,x^{76} -$$
$$62\,398\,902\,941\,300\,654\,373\,786\,286\,053\,314\,414\,887\,521\,761\,964\,305\,940\,480\,000\,x^{78} +$$
$$434\,422\,741\,996\,396\,960\,830\,157\,687\,712\,948\,458\,077\,683\,152\,916\,054\,016\,000\,x^{80} -$$
$$2\,616\,216\,452\,853\,941\,347\,968\,429\,314\,742\,237\,025\,460\,302\,035\,025\,920\,000\,x^{82} +$$
$$13\,508\,862\,923\,514\,327\,097\,943\,696\,978\,014\,993\,246\,782\,970\,920\,960\,000\,x^{84} -$$
$$59\,135\,925\,246\,574\,345\,709\,192\,654\,349\,723\,636\,648\,023\,949\,312\,000\,x^{86} +$$
$$216\,275\,588\,676\,081\,724\,119\,304\,378\,499\,511\,732\,777\,517\,056\,000\,x^{88} -$$
$$648\,016\,745\,096\,874\,079\,758\,215\,366\,290\,671\,858\,509\,414\,400\,x^{90} +$$
$$1\,548\,057\,202\,811\,452\,651\,118\,526\,914\,215\,651\,835\,904\,000\,x^{92} -$$
$$2\,833\,323\,638\,181\,565\,135\,883\,828\,715\,105\,288\,192\,000\,x^{94} +$$
$$3\,728\,057\,418\,659\,954\,126\,162\,932\,519\,875\,379\,200\,x^{96} -$$
$$3\,137\,435\,235\,564\,867\,768\,704\,340\,433\,305\,600\,x^{98} +$$
$$1\,267\,650\,600\,228\,229\,401\,496\,703\,205\,376\,x^{100}$$

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thursday 2.nb

$$000\,000\,x^{72} -$$
$$855\,839\,953\,154\,276\,787\,645\,462\,529\,649\,990\,521\,691\,665\,666\,441\,683\,664\,896\,000\,000\,x^{74} +$$
$$7\,807\,662\,730\,530\,244\,378\,520\,009\,042\,420\,966\,162\,801\,160\,465\,783\,780\,802\,560\,000\,x^{76} -$$
$$62\,398\,902\,941\,300\,654\,373\,786\,286\,053\,314\,414\,887\,521\,761\,964\,305\,940\,480\,000\,x^{78} +$$
$$434\,422\,741\,996\,396\,960\,830\,157\,687\,712\,948\,458\,077\,683\,152\,916\,054\,016\,000\,x^{80} -$$
$$2\,616\,216\,452\,853\,941\,347\,968\,429\,314\,742\,237\,025\,460\,302\,035\,025\,920\,000\,x^{82} +$$
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$$216\,275\,588\,676\,081\,724\,119\,304\,378\,499\,511\,732\,777\,517\,056\,000\,x^{88} -$$
$$648\,016\,745\,096\,874\,079\,758\,215\,366\,290\,671\,858\,509\,414\,400\,x^{90} +$$
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$$3\,137\,435\,235\,564\,867\,768\,704\,340\,433\,305\,600\,x^{98} +$$
$$1\,267\,650\,600\,228\,229\,401\,496\,703\,205\,376\,x^{100}$$

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thursday 2.nb

In[123]:=
```
HermiteH[M, x]
```

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thursday 2.nb

- Check of density
- Hermite Polynomials

In[123]:=
```
HermiteH[M, x]
```

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thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials

In[123]:=
```
HermiteH[M, x]
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

Live version

In[114]:=
```
M = 100;
```

Solving the equations

In[115]:=
```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[117]:=
```
fr = FindRoot[eqs, vars];
```

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

Check of density

Hermite Polynomials

In[123]:=
```
HermiteH[M, x]
```

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thursday 2.nb

In[114]:=
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```

Solving the equations

In[115]:=
```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[117]:=
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```

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

Check of density

Hermite Polynomials

In[123]:=
```
HermiteH[M, x]
```

```
NSol
```

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thursday 2.nb

In[114]:=
```
M = 100;
```

Solving the equations

In[115]:=
```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[117]:=
```
fr = FindRoot[eqs, vars];
```

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

Check of density

Hermite Polynomials

In[123]:=
```
HermiteH[M, x]
```

```
NSolve[H
```

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thursday 2.nb

In[114]:=
```
M = 100;
```

Solving the equations

In[115]:=
```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[117]:=
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fr = FindRoot[eqs, vars];
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In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

Check of density

Hermite Polynomials

In[123]:=
```
HermiteH[M, x]
```

```
NSolve[HermiteH[M, x]|
```

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thursday 2.nb

```
{x → 1.88912 - 3.26509 × 10^-8 i}, {x → 2.11295 + 1.62674 × 10^-6 i},
{x → 2.33733 - 0.0000194974 i}, {x → 2.5623 + 6.54176 × 10^-7 i},
{x → 2.788 - 3.53819 × 10^-6 i}, {x → 3.01561 + 0.00364814 i},
{x → 3.23443 + 0.00335743 i}, {x → 3.46756 + 0.158637 i},
{x → 3.5597 - 0.164266 i}, {x → 3.77007 + 0.263802 i},
{x → 3.9707 - 0.41326 i}, {x → 4.1282 + 0.419705 i},
{x → 4.39816 - 0.60615 i}, {x → 4.47546 + 0.719175 i},
{x → 4.6864 - 0.813229 i}, {x → 4.87914 + 0.994008 i},
{x → 5.26176 + 1.03884 i}, {x → 5.27665 - 1.12554 i},
{x → 5.42309 - 0.634532 i}, {x → 5.75579 + 1.4069 i},
{x → 5.99028 - 1.30585 i}, {x → 6.06854 + 1.43692 i},
{x → 6.57009 - 1.71242 i}, {x → 6.61592 + 1.65116 i},
{x → 7.27034 - 1.75606 i}, {x → 7.31742 + 1.81212 i},
{x → 7.96199 - 1.93226 i}, {x → 8.06244 + 1.90413 i},
{x → 8.38372 - 2.01986 i}, {x → 8.85193 + 1.93964 i},
{x → 9.22345 - 2.03044 i}, {x → 9.69597 + 1.89839 i},
{x → 10.107 - 1.86676 i}, {x → 10.5887 + 1.67559 i},
{x → 11.0388 - 1.73107 i}, {x → 11.5701 + 1.5409 i},
{x → 11.9396 - 1.37923 i}, {x → 12.282 + 0.925798 i},
{x → 12.5146 - 0.651076 i}, {x → 12.848 + 0.621395 i},
{x → 13.0007 - 0.121423 i}, {x → 13.3897 + 0.0407832 i}}
```

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thursday 2.nb

In[123]:= HermiteH[M, x]

In[124]:=
```
NSolve[HermiteH[M, x] == 0, x]
```

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thursday 2.nb

In[123]:=
```
HermiteH[M, x]
```

In[124]:=
```
NSolve[HermiteH[M, x] == 0, x]
```

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thursday 2.nb

In[123]:=
```
HermiteH[M, x]
```

```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision -]
```

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Running...thursday 2.nb

In[123]:=
```
HermiteH[M, x]
```

In[125]:=
```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

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thursday 2.nb

```
9.528965823390114804697065744307488780829168738449774517286045575
 649936402309068284249526476544666858}, {x →
9.832269807777969094355161531340931578094745392667077668701054067
 094778754563657564781490827979714635}, {x →
10.144509941292845469888588301440455941004734121264246777864477754
 440810133919442229958708980901290237}, {x →
10.467185421342812141783133163578050485368059197791282884552048 73
 296803629012201738135548914729525799}, {x →
10.802260753684714594821667549250484903522467770126351584465827 30
 614467249911387252731247538215761284}, {x →
11.152404385585125264899035250356738671218866476907322604550027 88
 401316875993099618797345238330084422}, {x →
11.521415400787030241694215193615806787762300833731699292443226 58
 851144666468937682665399619490106780}, {x →
11.915061943114165801984797918762777070787192719624307082690204 33
 754088327256838679816957056185944748}, {x →
12.342964222859674295102740266870727507684215885999096945596549 33
 384204094405704233633165658160599804}, {x →
12.823799749487808906339128813777215497484567268610334824922392 96
 918960235456168623348585269969198591}, {x →
13.406487338144910138498015358651607145889756981295225057172054 06
 103979330879664050291316092727922929}}
```

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thursday 2.nb

In[123]:= HermiteH[M, x]

In[125]:=
```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[125]=
```
{{x →
   -13.4064873381449101384980153586516071458897569812952250571720540
     61039793308796640502913160927279229 29},
  {x →
   -12.8237997494878089063391288137772154974845672686103348249223929
     69189602354561686233485852699691985 91},
  {x →
   -12.3429642228596742951027402668707275076842158859990969455965493
     33842040944057042336331656581605998 04},
  {x →
   -11.9150619431141658019847979187627770707871927196243070826902043
     37540883272568386798169570561859447 48},
  {x →
   -11.5214154007870302416942151936158067877623008337316992924432265
     88511446664689376826653996194901067 80},
  {x →
   -11.1524043855851252648990352503567386712188664769073226045500278
     84013168759930996187973452383300844 22},
  {x →
   -10.8022607536847145948216675492504849035224677701263515844658273
     06144672499113872527312475382157612 84},
  {x →
   -10.4671854213428121417831331635780504853680591977912828845520487
     32968036290122017381355489147295257 99},
  {x →
   -10.1445099412928454698885883014404559410047341212642467778644775
     44408101339194422299587089809012902 37},
  {x →
   -9.8322698077779690943551615313409315780947453926670776687010540
     70947787545636575647814908279797146 35},
  {x →
```

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thursday 2.nb

In[123]:= HermiteH[M, x]

In[125]:=
```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[125]=
```
{{x →
   -13.4064873381449101384980153586516071458897569812952250571720540
     61039793308796640502913160927279229 29},
   -12.8237997494878089063391288137772154974845672686103348249223929
     69189602354561686233485852699691985 91},
   -12.3429642228596742951027402668707275076842158859990969455965493
     33842040944057042336331656581605998 04},
   -11.9150619431141658019847979187627770707871927196243070826902043
     37540883272568386798169570561859447 48},
   -11.5214154007870302416942151936158067877623008337316992924432265
     88511446664689376826653996194901067 80},
   -11.1524043855851252648990352503567386712188664769073226045500278
     84013168759930996187973452383300844 22},
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   x →
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thursday 2.nb

In[123]:= HermiteH[M, x]

In[125]:=
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NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
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Out[125]=
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thursday 2.nb

In[123]:= HermiteH[M, x]

In[125]:=
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NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
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Out[125]=
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thursday 2.nb

In[123]:= HermiteH[M, x]

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In[123]:= HermiteH[M, x]

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thursday 2.nb

In[123]:= HermiteH[M, x]

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thursday 2.nb

In[123]:= HermiteH[M, x]

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Out[125]=
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In[123]:= HermiteH[M, x]

In[125]:=
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NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
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Out[125]=
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thursday 2.nb

In[123]:= HermiteH[M, x]

In[125]:=
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NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
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Out[125]=
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thursday 2.nb

In[123]:= HermiteH[M, x]

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NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
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thursday 2.nb

In[123]:= HermiteH[M, x]

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thursday 2.nb

In[123]:=
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HermiteH[M, x]
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In[125]:=
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Out[125]=
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In[123]:=
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In[123]:=
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   -10.8022607536847145948216675492504849035224677701263515844658273
    061446724991138725273124753821576 1284}, {x →
   -10.4671854213428121417831331635780504853680591977912828845520487
    329680362901220173813554891472952 5799}, {x →
   -10.1445099412928454698885883014404559410047341212642467778644775
    444081013391944229958708980901290 237}, {x →
```

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thursday 2.nb

In[123]:=
```
HermiteH[M, x]
```

In[125]:=
```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[125]=
```
{{x →
   -13.4064873381449101384980153586516071458897569812952250571720540
    610397933087966405029131609272792292 9}, {x →
   -12.8237997494878089063391288137772154974845672686103348249223929
    691896023545616862334858526996919859 1}, {x →
   -12.3429642228596742951027402668707275076842158859990969455965493
    338420409440570423363316565816059980 4}, {x →
   -11.9150619431141658019847979187627770707871927196243070826902043
    375408832725683867981695705618594474 8}, {x →
   -11.5214154007870302416942151936158067877623008337316992924432265
    885114466646893768266539961949010678 0}, {x →
   -11.1524043855851252648990352503567386712188664769073226045500278
    840131687599309961879734523833008442 2}, {x →
   -10.8022607536847145948216675492504849035224677701263515844658273
    061446724991138725273124753821576128 4}, {x →
   -10.4671854213428121417831331635780504853680591977912828845520487
    329680362901220173813554891472952579 9}, {x →
   -10.1445099412928454698885883014404559410047341212642467778644775
    444081013391944229958708980901290237}, {x →
```

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thursday 2.nb

In[123]:=
```
HermiteH[M, x]
```

```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] // N
```

Out[125]=
```
{{x →
   -13.4064873381449101384980153586516071458897569812952250571720540
    610397933087966405029131609272792292 9},
  {x →
   -12.8237997494878089063391288137772154974845672686103348249223929
    691896023545616862334858526996919859 1},
  {x →
   -12.3429642228596742951027402668707275076842158859990969455965493
    338420409440570423363316565816059980 4},
  {x →
   -11.9150619431141658019847979187627770707871927196243070826902043
    375408832725683867981695705618594474 8},
  {x →
   -11.5214154007870302416942151936158067877623008337316992924432265
    885114466646893768266539961949010678 0},
  {x →
   -11.1524043855851252648990352503567386712188664769073226045500278
    840131687599309961879734523833008442 2},
  {x →
   -10.8022607536847145948216675492504849035224677701263515844658273
    061446724991138725273124753821576128 4},
  {x →
   -10.4671854213428121417831331635780504853680591977912828845520487
    329680362901220173813554891472952579 9},
  {x →
   -10.1445099412928454698885883014404559410047341212642467778644775
    444081013391944229958708980901290237},
  {x →
```

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thursday 2.nb

```
{x → -10.1445}, {x → -9.83227}, {x → -9.52897}, {x → -9.23342},
{x → -8.94469}, {x → -8.662}, {x → -8.3847}, {x → -8.11225},
{x → -7.84418}, {x → -7.5801}, {x → -7.31965}, {x → -7.06253},
{x → -6.80846}, {x → -6.55721}, {x → -6.30854}, {x → -6.06228},
{x → -5.81823}, {x → -5.57624}, {x → -5.33616}, {x → -5.09785},
{x → -4.86118}, {x → -4.62603}, {x → -4.3923}, {x → -4.15989},
{x → -3.92869}, {x → -3.69862}, {x → -3.46959}, {x → -3.24151},
{x → -3.01432}, {x → -2.78794}, {x → -2.5623}, {x → -2.33732},
{x → -2.11295}, {x → -1.88912}, {x → -1.66576}, {x → -1.44283},
{x → -1.22025}, {x → -0.997977}, {x → -0.775951}, {x → -0.554115},
{x → -0.332415}, {x → -0.110796}, {x → 0.110796}, {x → 0.332415},
{x → 0.554115}, {x → 0.775951}, {x → 0.997977}, {x → 1.22025},
{x → 1.44283}, {x → 1.66576}, {x → 1.88912}, {x → 2.11295},
{x → 2.33732}, {x → 2.5623}, {x → 2.78794}, {x → 3.01432}, {x → 3.24151},
{x → 3.46959}, {x → 3.69862}, {x → 3.92869}, {x → 4.15989}, {x → 4.3923},
{x → 4.62603}, {x → 4.86118}, {x → 5.09785}, {x → 5.33616},
{x → 5.57624}, {x → 5.81823}, {x → 6.06228}, {x → 6.30854},
{x → 6.55721}, {x → 6.80846}, {x → 7.06253}, {x → 7.31965},
{x → 7.5801}, {x → 7.84418}, {x → 8.11225}, {x → 8.3847}, {x → 8.662},
{x → 8.94469}, {x → 9.23342}, {x → 9.52897}, {x → 9.83227},
{x → 10.1445}, {x → 10.4672}, {x → 10.8023}, {x → 11.1524},
{x → 11.5214}, {x → 11.9151}, {x → 12.343}, {x → 12.8238}, {x → 13.4065}}
```

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thursday 2.nb

- Check of density
- Hermite Polynomials

In[123]:=
```
HermiteH[M, x]
```

In[126]:=
```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] // N
```

Out[126]=
```
{{x → -13.4065}, {x → -12.8238}, {x → -12.343}, {x → -11.9151},
 {x → -11.5214}, {x → -11.1524}, {x → -10.8023}, {x → -10.4672},
 {x → -10.1445}, {x → -9.83227}, {x → -9.52897}, {x → -9.23342},
 {x → -8.94469}, {x → -8.662}, {x → -8.3847}, {x → -8.11225},
 {x → -7.84418}, {x → -7.5801}, {x → -7.31965}, {x → -7.06253},
 {x → -6.80846}, {x → -6.55721}, {x → -6.30854}, {x → -6.06228},
 {x → -5.81823}, {x → -5.57624}, {x → -5.33616}, {x → -5.09785},
 {x → -4.86118}, {x → -4.62603}, {x → -4.3923}, {x → -4.15989},
 {x → -3.92869}, {x → -3.69862}, {x → -3.46959}, {x → -3.24151},
 {x → -3.01432}, {x → -2.78794}, {x → -2.5623}, {x → -2.33732},
 {x → -2.11295}, {x → -1.88912}, {x → -1.66576}, {x → -1.44283},
 {x → -1.22025}, {x → -0.997977}, {x → -0.775951}, {x → -0.554115},
 {x → -0.332415}, {x → -0.110796}, {x → 0.110796}, {x → 0.332415},
 {x → 0.554115}, {x → 0.775951}, {x → 0.997977}, {x → 1.22025},
 {x → 1.44283}, {x → 1.66576}, {x → 1.88912}, {x → 2.11295},
```

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thursday 2.nb

- Check of density
- Hermite Polynomials

In[123]:=
```
HermiteH[M, x]
```

```
fr
```

```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[126]=
```
{{x → -13.4065}, {x → -12.8238}, {x → -12.343}, {x → -11.9151},
 {x → -11.5214}, {x → -11.1524}, {x → -10.8023}, {x → -10.4672},
 {x → -10.1445}, {x → -9.83227}, {x → -9.52897}, {x → -9.23342},
 {x → -8.94469}, {x → -8.662}, {x → -8.3847}, {x → -8.11225},
 {x → -7.84418}, {x → -7.5801}, {x → -7.31965}, {x → -7.06253},
 {x → -6.80846}, {x → -6.55721}, {x → -6.30854}, {x → -6.06228},
 {x → -5.81823}, {x → -5.57624}, {x → -5.33616}, {x → -5.09785},
 {x → -4.86118}, {x → -4.62603}, {x → -4.3923}, {x → -4.15989},
 {x → -3.92869}, {x → -3.69862}, {x → -3.46959}, {x → -3.24151},
 {x → -3.01432}, {x → -2.78794}, {x → -2.5623}, {x → -2.33732},
 {x → -2.11295}, {x → -1.88912}, {x → -1.66576}, {x → -1.44283},
 {x → -1.22025}, {x → -0.997977}, {x → -0.775951}, {x → -0.554115},
 {x → -0.332415}, {x → -0.110796}, {x → 0.110796}, {x → 0.332415},
```

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thursday 2.nb

```
x[17] → -7.84418, x[18] → -7.5801, x[19] → -7.31965, x[20] → -7.06253,
x[21] → -6.80846, x[22] → -6.55721, x[23] → -6.30854, x[24] → -6.06228,
x[25] → -5.81823, x[26] → -5.57624, x[27] → -5.33616, x[28] → -5.09785,
x[29] → -4.86118, x[30] → -4.62603, x[31] → -4.3923, x[32] → -4.15989,
x[33] → -3.92869, x[34] → -3.69862, x[35] → -3.46959, x[36] → -3.24151,
x[37] → -3.01432, x[38] → -2.78794, x[39] → -2.5623, x[40] → -2.33732,
x[41] → -2.11295, x[42] → -1.88912, x[43] → -1.66576,
x[44] → -1.44283, x[45] → -1.22025, x[46] → -0.997977,
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

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thursday 2.nb

```
x[17] → -7.84418, x[18] → -7.5801, x[19] → -7.31965, x[20] → -7.06253,
x[21] → -6.80846, x[22] → -6.55721, x[23] → -6.30854, x[24] → -6.06228,
x[25] → -5.81823, x[26] → -5.57624, x[27] → -5.33616, x[28] → -5.09785,
x[29] → -4.86118, x[30] → -4.62603, x[31] → -4.3923, x[32] → -4.15989,
x[33] → -3.92869, x[34] → -3.69862, x[35] → -3.46959, x[36] → -3.24151,
x[37] → -3.01432, x[38] → -2.78794, x[39] → -2.5623, x[40] → -2.33732,
x[41] → -2.11295, x[42] → -1.88912, x[43] → -1.66576,
x[44] → -1.44283, x[45] → -1.22025, x[46] → -0.997977,
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

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thursday 2.nb

```
x[17] → -7.84418, x[18] → -7.5801, x[19] → -7.31965, x[20] → -7.06253,
x[21] → -6.80846, x[22] → -6.55721, x[23] → -6.30854, x[24] → -6.06228,
x[25] → -5.81823, x[26] → -5.57624, x[27] → -5.33616, x[28] → -5.09785,
x[29] → -4.86118, x[30] → -4.62603, x[31] → -4.3923, x[32] → -4.15989,
x[33] → -3.92869, x[34] → -3.69862, x[35] → -3.46959, x[36] → -3.24151,
x[37] → -3.01432, x[38] → -2.78794, x[39] → -2.5623, x[40] → -2.33732,
x[41] → -2.11295, x[42] → -1.88912, x[43] → -1.66576,
x[44] → -1.44283, x[45] → -1.22025, x[46] → -0.997977,
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

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thursday 2.nb

```
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.9[illegible]869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[126]=

```
{{x → -13.4065}, {x → -12.8238}, {x → -12.343}, {x → -11.9151},
 {x → -11.5214}, {x → -11.1524}, {x → -10.8023}, {x → -10.4672},
 {x → -10.1445}, {x → -9.83227}, {x → -9.52897}, {x → -9.23342},
 {x → -8.94469}, {x → -8.662}, {x → -8.3847}, {x → -8.11225},
 {x → -7.84418}, {x → -7.5801}, {x → -7.31965}, {x → -7.06253},
 {x → -6.80846}, {x → -6.55721}, {x → -6.30854}, {x → -6.06228},
 {x → -5.81823}, {x → -5.57624}, {x → -5.33616}, {x → -5.09785},
```

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thursday 2.nb

```
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.9[illegible]869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

```
NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[126]=

```
{{x → -13.4065}, {x → -12.8238}, {x → -12.343}, {x → -11.9151},
 {x → -11.5214}, {x → -11.1524}, {x → -10.8023}, {x → -10.4672},
 {x → -10.1445}, {x → -9.83227}, {x → -9.52897}, {x → -9.23342},
 {x → -8.94469}, {x → -8.662}, {x → -8.3847}, {x → -8.11225},
 {x → -7.84418}, {x → -7.5801}, {x → -7.31965}, {x → -7.06253},
 {x → -6.80846}, {x → -6.55721}, {x → -6.30854}, {x → -6.06228},
 {x → -5.81823}, {x → -5.57624}, {x → -5.33616}, {x → -5.09785},
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

```
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

```
x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[126]=

```
{{x → -13.4065}, {x → -12.8238}, {x → -12.343}, {x → -11.9151},
 {x → -11.5214}, {x → -11.1524}, {x → -10.8023}, {x → -10.4672},
 {x → -10.1445}, {x → -9.83227}, {x → -9.52897}, {x → -9.23342},
 {x → -8.94469}, {x → -8.662}, {x → -8.3847}, {x → -8.11225},
 {x → -7.84418}, {x → -7.5801}, {x → -7.31965}, {x → -7.06253},
 {x → -6.80846}, {x → -6.55721}, {x → -6.30854}, {x → -6.06228},
 {x → -5.81823}, {x → -5.57624}, {x → -5.33616}, {x → -5.09785},
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

Running...thursday 2.nb

```
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[128]:=

```
x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[126]=

```
{{x → -13.4065}, {x → -12.8238}, {x → -12.343}, {x → -11.9151},
 {x → -11.5214}, {x → -11.1524}, {x → -10.8023}, {x → -10.4672},
 {x → -10.1445}, {x → -9.83227}, {x → -9.52897}, {x → -9.23342},
 {x → -8.94469}, {x → -8.662}, {x → -8.3847}, {x → -8.11225},
 {x → -7.84418}, {x → -7.5801}, {x → -7.31965}, {x → -7.06253},
 {x → -6.80846}, {x → -6.55721}, {x → -6.30854}, {x → -6.06228},
 {x → -5.81823}, {x → -5.57624}, {x → -5.33616}, {x → -5.09785},
```

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thursday 2.nb

```
-8.1122473111627919172116920138170293561681703167016002110428366159
 9564344951903480343335111556483287 6,
-7.8441823844608211687920795305108108525882918227801973984098026886
 9648312325328765301219792502491069 4,
-7.5801008078574888842858087147798508005952446740540945677192169554
 9945409472338442967918804782691611 8,
-7.3196528223045353163320619830886983154201857246217903244639380132
 7002996321535474928178250938368374 9,
-7.0625310602488654374655227313402111369558533713012115279611172061
 7548141189345388006556548188522621 4,
-6.8084633528587964144789809043219887893673137842015956696475008783
 5659161437202626218851761347189569 6,
-6.5572070319215393159801431092748363242153412136855770618561199942
 4558203076685321882331580426489103 8,
-6.3085443611121351216388174153874158418899967897332704833362499453
 9939126589155641850662503738167183 8,
-6.0622788326143026386651846010776852194050157282097797276233160767
 6621453286663569504974781387548510 2,
-5.8182321352035170473622698170478695905988755193471267208205267205
 9503212849095267903080398109092931 0,
-5.5762416493299241033034851100970939533372038220981612782295494301
 0940829751321646704052562853289698 2,
-5.3361583601383604972771152654631793693757767432758103958972702926
 5074944691196509742911065971920009 6,
-5.0978451050891362470000919393992882018148316917197696067898879805
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

```
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[128]:=

```
x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[128]=

```
{-13.406487338144910138498015358651607145889756981295225057172054061
   039793308796640502913160927279229 29,
 -12.823799749487808906339128813777215497484567268610334824922392969
   189602354561686233485852699691985 91,
 -12.342964222859674295102740266870727507684215885999096945596549333
   842040944057042336331656581605998 04,
 -11.915061943114165801984797918762777070787192719624307082690204337
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

```
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

```
SolHx /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

Out[128]=

```
{-13.4064873381449101384980153586516071458897569812952250571720540610
   3979330879664050291316092727922929,
 -12.8237997494878089063391288137772154974845672686103348249223929691
   8960235456168623348585269969198591,
 -12.3429642228596742951027402668707275076842158859990969455965493338
   4204094405704233633165658160599804,
 -11.9150619431141658019847979187627770707871927196243070826902043371
```

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thursday 2.nb

```
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100]
```

```
Out[128]= {-13.406487338144910138498015358651607145889756981295225057172054061
   039793308796640502913160927279229 29,
 -12.823799749487808906339128813777215497484567268610334824922392969
   189602354561686233485852699691985 91,
 -12.342964222859674295102740266870727507684215885999096945596549333
   842040944057042336331656581605998 04,
 -11.915061943114165801984797918762777070787192719624307082690204337
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

```
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

```
Out[128]= {-13.406487338144910138498015358651607145889756981295225057172054061
   039793308796640502913160927279229 29,
 -12.823799749487808906339128813777215497484567268610334824922392969
   189602354561686233485852699691985 91,
 -12.342964222859674295102740266870727507684215885999096945596549333
   842040944057042336331656581605998 04,
 -11.915061943114165801984797918762777070787192719624307082690204337
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

Running...thursday 2.nb

```
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

Out[128]=
```
{-13.406487338144910138498015358651607145889756981295225057172054061
   039793308796640502913160927279229 29,
 -12.823799749487808906339128813777215497484567268610334824922392969
   189602354561686233485852699691985 91,
 -12.342964222859674295102740266870727507684215885999096945596549333
   842040944057042336331656581605998 04,
 -11.915061943114165801984797918762777070787192719624307082690204337
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

```
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=

```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

```
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

```
x /@ Ra
```

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

```
x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

```
x /@ Range[]
```

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thursday 2.nb

```
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

In[130]:=
```
x /@ Range[M]
```

Out[130]=
```
{x[1], x[2], x[3], x[4], x[5], x[6], x[7], x[8], x[9], x[10],
 x[11], x[12], x[13], x[14], x[15], x[16], x[17], x[18], x[19],
 x[20], x[21], x[22], x[23], x[24], x[25], x[26], x[27], x[28],
 x[29], x[30], x[31], x[32], x[33], x[34], x[35], x[36], x[37],
 x[38], x[39], x[40], x[41], x[42], x[43], x[44], x[45], x[46],
 x[47], x[48], x[49], x[50], x[51], x[52], x[53], x[54], x[55],
 x[56], x[57], x[58], x[59], x[60], x[61], x[62], x[63], x[64],
 x[65], x[66], x[67], x[68], x[69], x[70], x[71], x[72], x[73],
 x[74], x[75], x[76], x[77], x[78], x[79], x[80], x[81], x[82],
 x[83], x[84], x[85], x[86], x[87], x[88], x[89], x[90], x[91],
 x[92], x[93], x[94], x[95], x[96], x[97], x[98], x[99], x[100]}
```

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thursday 2.nb

```
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

In[131]:=
```
x /@ Range[M] /. fr
```

Out[131]=
```
{-13.4065, -12.8238, -12.343, -11.9151, -11.5214, -11.1524, -10.8023,
 -10.4672, -10.1445, -9.83227, -9.52897, -9.23342, -8.94469,
 -8.662, -8.3847, -8.11225, -7.84418, -7.5801, -7.31965, -7.06253,
 -6.80846, -6.55721, -6.30854, -6.06228, -5.81823, -5.57624,
 -5.33616, -5.09785, -4.86118, -4.62603, -4.3923, -4.15989,
 -3.92869, -3.69862, -3.46959, -3.24151, -3.01432, -2.78794,
 -2.5623, -2.33732, -2.11295, -1.88912, -1.66576, -1.44283,
 -1.22025, -0.997977, -0.775951, -0.554115, -0.332415, -0.110796,
 0.110796, 0.332415, 0.554115, 0.775951, 0.997977, 1.22025, 1.44283,
 1.66576, 1.88912, 2.11295, 2.33732, 2.5623, 2.78794, 3.01432,
 3.24151, 3.46959, 3.69862, 3.92869, 4.15989, 4.3923, 4.62603,
 4.86118, 5.09785, 5.33616, 5.57624, 5.81823, 6.06228, 6.30854,
 6.55721, 6.80846, 7.06253, 7.31965, 7.5801, 7.84418, 8.11225,
 8.3847, 8.662, 8.94469, 9.23342, 9.52897, 9.83227, 10.1445, 10.4672,
 10.8023, 11.1524, 11.5214, 11.9151, 12.343, 12.8238, 13.4065}
```

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thursday 2.nb

```
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

In[131]:=
```
x /@ Range[M] /. fr
```

Out[131]=
```
{-13.4065, -12.8238, -12.343, -11.9151, -11.5214, -11.1524, -10.8023,
 -10.4672, -10.1445, -9.83227, -9.52897, -9.23342, -8.94469,
 -8.662, -8.3847, -8.11225, -7.84418, -7.5801, -7.31965, -7.06253,
 -6.80846, -6.55721, -6.30854, -6.06228, -5.81823, -5.57624,
 -5.33616, -5.09785, -4.86118, -4.62603, -4.3923, -4.15989,
 -3.92869, -3.69862, -3.46959, -3.24151, -3.01432, -2.78794,
 -2.5623, -2.33732, -2.11295, -1.88912, -1.66576, -1.44283,
 -1.22025, -0.997977, -0.775951, -0.554115, -0.332415, -0.110796,
 0.110796, 0.332415, 0.554115, 0.775951, 0.997977, 1.22025, 1.44283,
 1.66576, 1.88912, 2.11295, 2.33732, 2.5623, 2.78794, 3.01432,
 3.24151, 3.46959, 3.69862, 3.92869, 4.15989, 4.3923, 4.62603,
 4.86118, 5.09785, 5.33616, 5.57624, 5.81823, 6.06228, 6.30854,
 6.55721, 6.80846, 7.06253, 7.31965, 7.5801, 7.84418, 8.11225,
 8.3847, 8.662, 8.94469, 9.23342, 9.52897, 9.83227, 10.1445, 10.4672,
 10.8023, 11.1524, 11.5214, 11.9151, 12.343, 12.8238, 13.4065}
```

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thursday 2.nb

```
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

```
Solx /@ Range[M] /. fr
```

Out[131]=
```
{-13.4065, -12.8238, -12.343, -11.9151, -11.5214, -11.1524, -10.8023,
 -10.4672, -10.1445, -9.83227, -9.52897, -9.23342, -8.94469,
 -8.662, -8.3847, -8.11225, -7.84418, -7.5801, -7.31965, -7.06253,
 -6.80846, -6.55721, -6.30854, -6.06228, -5.81823, -5.57624,
 -5.33616, -5.09785, -4.86118, -4.62603, -4.3923, -4.15989,
 -3.92869, -3.69862, -3.46959, -3.24151, -3.01432, -2.78794,
 -2.5623, -2.33732, -2.11295, -1.88912, -1.66576, -1.44283,
 -1.22025, -0.997977, -0.775951, -0.554115, -0.332415, -0.110796,
 0.110796, 0.332415, 0.554115, 0.775951, 0.997977, 1.22025, 1.44283,
 1.66576, 1.88912, 2.11295, 2.33732, 2.5623, 2.78794, 3.01432,
 3.24151, 3.46959, 3.69862, 3.92869, 4.15989, 4.3923, 4.62603,
 4.86118, 5.09785, 5.33616, 5.57624, 5.81823, 6.06228, 6.30854,
 6.55721, 6.80846, 7.06253, 7.31965, 7.5801, 7.84418, 8.11225,
 8.3847, 8.662, 8.94469, 9.23342, 9.52897, 9.83227, 10.1445, 10.4672,
 10.8023, 11.1524, 11.5214, 11.9151, 12.343, 12.8238, 13.4065}
```

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thursday 2.nb

```
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

```
SolEl[x] /@ Range[M] /. fr
```

Out[131]=
```
{-13.4065, -12.8238, -12.343, -11.9151, -11.5214, -11.1524, -10.8023,
 -10.4672, -10.1445, -9.83227, -9.52897, -9.23342, -8.94469,
 -8.662, -8.3847, -8.11225, -7.84418, -7.5801, -7.31965, -7.06253,
 -6.80846, -6.55721, -6.30854, -6.06228, -5.81823, -5.57624,
 -5.33616, -5.09785, -4.86118, -4.62603, -4.3923, -4.15989,
 -3.92869, -3.69862, -3.46959, -3.24151, -3.01432, -2.78794,
 -2.5623, -2.33732, -2.11295, -1.88912, -1.66576, -1.44283,
 -1.22025, -0.997977, -0.775951, -0.554115, -0.332415, -0.110796,
 0.110796, 0.332415, 0.554115, 0.775951, 0.997977, 1.22025, 1.44283,
 1.66576, 1.88912, 2.11295, 2.33732, 2.5623, 2.78794, 3.01432,
 3.24151, 3.46959, 3.69862, 3.92869, 4.15989, 4.3923, 4.62603,
 4.86118, 5.09785, 5.33616, 5.57624, 5.81823, 6.06228, 6.30854,
 6.55721, 6.80846, 7.06253, 7.31965, 7.5801, 7.84418, 8.11225,
 8.3847, 8.662, 8.94469, 9.23342, 9.52897, 9.83227, 10.1445, 10.4672,
 10.8023, 11.1524, 11.5214, 11.9151, 12.343, 12.8238, 13.4065}
```

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thursday 2.nb

```
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[129]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
```

```
SolEl = x /@ Range[M] /. fr
```

Out[131]=
```
{-13.4065, -12.8238, -12.343, -11.9151, -11.5214, -11.1524, -10.8023,
 -10.4672, -10.1445, -9.83227, -9.52897, -9.23342, -8.94469,
 -8.662, -8.3847, -8.11225, -7.84418, -7.5801, -7.31965, -7.06253,
 -6.80846, -6.55721, -6.30854, -6.06228, -5.81823, -5.57624,
 -5.33616, -5.09785, -4.86118, -4.62603, -4.3923, -4.15989,
 -3.92869, -3.69862, -3.46959, -3.24151, -3.01432, -2.78794,
 -2.5623, -2.33732, -2.11295, -1.88912, -1.66576, -1.44283,
 -1.22025, -0.997977, -0.775951, -0.554115, -0.332415, -0.110796,
 0.110796, 0.332415, 0.554115, 0.775951, 0.997977, 1.22025, 1.44283,
 1.66576, 1.88912, 2.11295, 2.33732, 2.5623, 2.78794, 3.01432,
 3.24151, 3.46959, 3.69862, 3.92869, 4.15989, 4.3923, 4.62603,
 4.86118, 5.09785, 5.33616, 5.57624, 5.81823, 6.06228, 6.30854,
 6.55721, 6.80846, 7.06253, 7.31965, 7.5801, 7.84418, 8.11225,
 8.3847, 8.662, 8.94469, 9.23342, 9.52897, 9.83227, 10.1445, 10.4672,
 10.8023, 11.1524, 11.5214, 11.9151, 12.343, 12.8238, 13.4065}
```

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thursday 2.nb

```
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

```
Out[131]= {-13.4065, -12.8238, -12.343, -11.9151, -11.5214, -11.1524, -10.8023,
 -10.4672, -10.1445, -9.83227, -9.52897, -9.23342, -8.94469,
 -8.662, -8.3847, -8.11225, -7.84418, -7.5801, -7.31965, -7.06253,
 -6.80846, -6.55721, -6.30854, -6.06228, -5.81823, -5.57624,
 -5.33616, -5.09785, -4.86118, -4.62603, -4.3923, -4.15989,
 -3.92869, -3.69862, -3.46959, -3.24151, -3.01432, -2.78794,
 -2.5623, -2.33732, -2.11295, -1.88912, -1.66576, -1.44283,
 -1.22025, -0.997977, -0.775951, -0.554115, -0.332415, -0.110796,
 0.110796, 0.332415, 0.554115, 0.775951, 0.997977, 1.22025, 1.44283,
 1.66576, 1.88912, 2.11295, 2.33732, 2.5623, 2.78794, 3.01432,
 3.24151, 3.46959, 3.69862, 3.92869, 4.15989, 4.3923, 4.62603,
 4.86118, 5.09785, 5.33616, 5.57624, 5.81823, 6.06228, 6.30854,
 6.55721, 6.80846, 7.06253, 7.31965, 7.5801, 7.84418, 8.11225,
 8.3847, 8.662, 8.94469, 9.23342, 9.52897, 9.83227, 10.1445, 10.4672,
 10.8023, 11.1524, 11.5214, 11.9151, 12.343, 12.8238, 13.4065}
```

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Running...thursday 2.nb

```
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

Out[131]=
```
{-13.4065, -12.8238, -12.343, -11.9151, -11.5214, -11.1524, -10.8023,
 -10.4672, -10.1445, -9.83227, -9.52897, -9.23342, -8.94469,
 -8.662, -8.3847, -8.11225, -7.84418, -7.5801, -7.31965, -7.06253,
 -6.80846, -6.55721, -6.30854, -6.06228, -5.81823, -5.57624,
 -5.33616, -5.09785, -4.86118, -4.62603, -4.3923, -4.15989,
 -3.92869, -3.69862, -3.46959, -3.24151, -3.01432, -2.78794,
 -2.5623, -2.33732, -2.11295, -1.88912, -1.66576, -1.44283,
 -1.22025, -0.997977, -0.775951, -0.554115, -0.332415, -0.110796,
 0.110796, 0.332415, 0.554115, 0.775951, 0.997977, 1.22025, 1.44283,
 1.66576, 1.88912, 2.11295, 2.33732, 2.5623, 2.78794, 3.01432,
 3.24151, 3.46959, 3.69862, 3.92869, 4.15989, 4.3923, 4.62603,
 4.86118, 5.09785, 5.33616, 5.57624, 5.81823, 6.06228, 6.30854,
 6.55721, 6.80846, 7.06253, 7.31965, 7.5801, 7.84418, 8.11225,
 8.3847, 8.662, 8.94469, 9.23342, 9.52897, 9.83227, 10.1445, 10.4672,
 10.8023, 11.1524, 11.5214, 11.9151, 12.343, 12.8238, 13.4065}
```

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thursday 2.nb

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

```
SolE
```

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thursday 2.nb

0., 0., 0., 0., 0., 0., 0., -8.88178×10^{-16}, -8.88178×10^{-16},
-8.88178×10^{-16}, 0., 0., 0., -8.88178×10^{-16}, 0., -8.88178×10^{-16},
-8.88178×10^{-16}, 0., -8.88178×10^{-16}, 0., -8.88178×10^{-16},
-4.44089×10^{-16}, -4.44089×10^{-16}, -4.44089×10^{-16}, -4.44089×10^{-16},
-4.44089×10^{-16}, -4.44089×10^{-16}, -4.44089×10^{-16}, -8.88178×10^{-16},
-4.44089×10^{-16}, -6.66134×10^{-16}, -6.66134×10^{-16}, -6.66134×10^{-16},
-6.66134×10^{-16}, -5.55112×10^{-16}, -7.77156×10^{-16}, -6.66134×10^{-16},
-5.55112×10^{-16}, -5.41234×10^{-16}, -5.82867×10^{-16}, -4.44089×10^{-16},
-4.44089×10^{-16}, -3.33067×10^{-16}, -5.55112×10^{-16}, -4.44089×10^{-16},
-4.44089×10^{-16}, -4.44089×10^{-16}, -4.44089×10^{-16}, -4.44089×10^{-16},
-4.44089×10^{-16}, -4.44089×10^{-16}, -4.44089×10^{-16}, -4.44089×10^{-16},
-4.44089×10^{-16}, -4.44089×10^{-16}, -4.44089×10^{-16}, -8.88178×10^{-16},
0., -8.88178×10^{-16}, 0., -8.88178×10^{-16}, 0., 0., -8.88178×10^{-16},
0., -8.88178×10^{-16}, 0., 0., 0., 0., 0., -8.88178×10^{-16},
-8.88178×10^{-16}, 0., -1.77636×10^{-15}, -1.77636×10^{-15},
-1.77636×10^{-15}, 0., 0., 0., 0., 0., -1.77636×10^{-15}, -1.77636×10^{-15},
0., -1.77636×10^{-15}, 0., -1.77636×10^{-15}, -1.77636×10^{-15}}

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thursday 2.nb

In[134]:= **SolEl - SolHer**

Out[134]=

$$\{0., 0., 0., 0., -1.77636\times10^{-15}, 0., 0., 0., 0., 0., 0.,$$
$$0., 0., 0., 0., 0., 0., 0., -8.88178\times10^{-16}, -8.88178\times10^{-16},$$
$$-8.88178\times10^{-16}, 0., 0., 0., -8.88178\times10^{-16}, 0., -8.88178\times10^{-16},$$
$$-8.88178\times10^{-16}, 0., -8.88178\times10^{-16}, 0., -8.88178\times10^{-16},$$
$$-4.44089\times10^{-16}, -4.44089\times10^{-16}, -4.44089\times10^{-16}, -4.44089\times10^{-16},$$
$$-4.44089\times10^{-16}, -4.44089\times10^{-16}, -4.44089\times10^{-16}, -8.88178\times10^{-16},$$
$$-4.44089\times10^{-16}, -6.66134\times10^{-16}, -6.66134\times10^{-16}, -6.66134\times10^{-16},$$
$$-6.66134\times10^{-16}, -5.55112\times10^{-16}, -7.77156\times10^{-16}, -6.66134\times10^{-16},$$
$$-5.55112\times10^{-16}, -5.41234\times10^{-16}, -5.82867\times10^{-16}, -4.44089\times10^{-16},$$
$$-4.44089\times10^{-16}, -3.33067\times10^{-16}, -5.55112\times10^{-16}, -4.44089\times10^{-16},$$
$$-4.44089\times10^{-16}, -4.44089\times10^{-16}, -4.44089\times10^{-16}, -4.44089\times10^{-16},$$
$$-4.44089\times10^{-16}, -4.44089\times10^{-16}, -4.44089\times10^{-16}, -4.44089\times10^{-16},$$
$$-4.44089\times10^{-16}, -4.44089\times10^{-16}, -4.44089\times10^{-16}, -8.88178\times10^{-16},$$
$$0., -8.88178\times10^{-16}, 0., -8.88178\times10^{-16}, 0., 0., -8.88178\times10^{-16},$$
$$0., -8.88178\times10^{-16}, 0., 0., 0., 0., 0., -8.88178\times10^{-16},$$
$$-8.88178\times10^{-16}, 0., -1.77636\times10^{-15}, -1.77636\times10^{-15},$$
$$-1.77636\times10^{-15}, 0., 0., 0., 0., 0., -1.77636\times10^{-15}, -1.77636\times10^{-15}$$

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thursday 2.nb

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

```
SolEl - SolHer // C
```

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thursday 2.nb

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

In[135]:=
```
SolEl - SolHer // Chop
```

Out[135]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

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thursday 2.nb

```
x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
x[81] → 7.06253, x[82] → 7.31965, x[83] → 7.5801, x[84] → 7.84418,
x[85] → 8.11225, x[86] → 8.3847, x[87] → 8.662, x[88] → 8.94469,
x[89] → 9.23342, x[90] → 9.52897, x[91] → 9.83227, x[92] → 10.1445,
x[93] → 10.4672, x[94] → 10.8023, x[95] → 11.1524, x[96] → 11.5214,
x[97] → 11.9151, x[98] → 12.343, x[99] → 12.8238, x[100] → 13.4065}
```

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

In[135]:=
```
SolEl - SolHer // Chop
```

Out[135]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

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thursday 2.nb

In[123]:= `hermiten[M, x]`

In[127]:= `fr`

Out[127]=

```
{x[1] → -13.4065, x[2] → -12.8238, x[3] → -12.343, x[4] → -11.9151,
 x[5] → -11.5214, x[6] → -11.1524, x[7] → -10.8023, x[8] → -10.4672,
 x[9] → -10.1445, x[10] → -9.83227, x[11] → -9.52897, x[12] → -9.23342,
 x[13] → -8.94469, x[14] → -8.662, x[15] → -8.3847, x[16] → -8.11225,
 x[17] → -7.84418, x[18] → -7.5801, x[19] → -7.31965, x[20] → -7.06253,
 x[21] → -6.80846, x[22] → -6.55721, x[23] → -6.30854, x[24] → -6.06228,
 x[25] → -5.81823, x[26] → -5.57624, x[27] → -5.33616, x[28] → -5.09785,
 x[29] → -4.86118, x[30] → -4.62603, x[31] → -4.3923, x[32] → -4.15989,
 x[33] → -3.92869, x[34] → -3.69862, x[35] → -3.46959, x[36] → -3.24151,
 x[37] → -3.01432, x[38] → -2.78794, x[39] → -2.5623, x[40] → -2.33732,
 x[41] → -2.11295, x[42] → -1.88912, x[43] → -1.66576,
 x[44] → -1.44283, x[45] → -1.22025, x[46] → -0.997977,
 x[47] → -0.775951, x[48] → -0.554115, x[49] → -0.332415,
 x[50] → -0.110796, x[51] → 0.110796, x[52] → 0.332415,
 x[53] → 0.554115, x[54] → 0.775951, x[55] → 0.997977, x[56] → 1.22025,
 x[57] → 1.44283, x[58] → 1.66576, x[59] → 1.88912, x[60] → 2.11295,
 x[61] → 2.33732, x[62] → 2.5623, x[63] → 2.78794, x[64] → 3.01432,
 x[65] → 3.24151, x[66] → 3.46959, x[67] → 3.69862, x[68] → 3.92869,
 x[69] → 4.15989, x[70] → 4.3923, x[71] → 4.62603, x[72] → 4.86118,
 x[73] → 5.09785, x[74] → 5.33616, x[75] → 5.57624, x[76] → 5.81823,
 x[77] → 6.06228, x[78] → 6.30854, x[79] → 6.55721, x[80] → 6.80846,
```

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thursday 2.nb

In[123]:=
```
HermiteH[M, x]
```

In[127]:=
```
fr
```

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

In[135]:=
```
SolEl - SolHer // Chop
```

Out[135]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

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thursday 2.nb

In[123]:=
```
HermiteH[M, x]
```

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

In[135]:=
```
SolEl - SolHer // Chop
```

Out[135]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

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thursday 2.nb

- Check of density
- Hermite Polynomials

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

In[135]:=
```
SolEl - SolHer // Chop
```

Out[135]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

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thursday 2.nb

- Check of density
- Hermite Polynomials

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

In[135]:=
```
SolEl - SolHer // Chop
```

Out[135]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- Check differential

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thursday 2.nb

- Check of density
- Hermite Polynomials

In[132]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100];
SolEl = x /@ Range[M] /. fr;
```

In[135]:=
```
SolEl - SolHer // Chop
```

Out[135]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- Check differential equations

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thursday 2.nb

- Check of density
- Hermite Polynomials

```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr;
```

In[135]:=
```
SolEl - SolHer // Chop
```

Out[135]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- Check differential equations

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Running...thursday 2.nb

- Check of density
- Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[135]:=
```
SolEl - SolHer // Chop
```

Out[135]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- Check differential equations

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thursday 2.nb

Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

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thursday 2.nb

Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
Q''|
```

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thursday 2.nb

Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
Q''[x] - 2 x Q'[x] + 2 M Q[x]
```

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thursday 2.nb

- Check of density
- Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- Check differential equations

```
Block[Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0
```

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thursday 2.nb

Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
Block[{MQ''[x] - 2 x Q'[x] + 2 M Q[x] == 0
```

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thursday 2.nb

Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
Block[{M}, Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0
```

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thursday 2.nb

Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[139]:=
```
Block[{M}, Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0]
```

Out[139]=
```
200 Q[x] - 2 x Q′[x] + Q″[x] == 0
```

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thursday 2.nb

Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[139]:=
```
Block[{M}, Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0]
```

Out[139]=
```
200 Q[x] - 2 x Q'[x] + Q''[x] == 0
```

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thursday 2.nb

Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[140]:=
```
Module[{M}, Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0]
```

Out[140]=
```
2 M$334252 Q[x] - 2 x Q′[x] + Q″[x] == 0
```

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thursday 2.nb

Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
a = 1
```

In[140]:=
```
Module[{M}, Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0]
```

Out[140]=
```
2 M$334252 Q[x] - 2 x Q′[x] + Q″[x] == 0
```

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Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
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In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[141]:=
```
a = 1;
```

```
Block[
```


In[140]:=
```
Module[{M}, Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0]
```

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Check of density

Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[141]:=
```
a = 1;
```

```
Block[{a}, a]
```


In[140]:=
```
Module[{M}, Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0]
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[141]:=
```
a = 1;
```

In[142]:=
```
Block[{a}, a]
```

Out[142]=
```
1
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[140]:=
```
Module[{M}, Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0]
```

Out[140]=
```
2 M$334252 Q[x] - 2 x Q'[x] + Q''[x] == 0
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
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In[138]:=
```
SolEl - SolHer // Chop
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Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0]|
```

Out[140]=
```
2 M$334252 Q[x] - 2 x Q′[x] + Q″[x] == 0
```

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Hermite Polynomials

In[136]:=
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SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
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Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
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{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
∃
```

```
Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
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Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
Q''[x] - 2 x Q'[x] + 2 M Q[x] == 0
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
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In[138]:=
```
SolEl - SolHer // Chop
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Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[143]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0
```

Out[143]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x] == 0
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0
```

Out[143]=
$$2\, m\, Q[x] - 2\, x\, Q'[x] + Q''[x] == 0$$

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
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In[138]:=
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SolEl - SolHer // Chop
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Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0
```

Out[143]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x] == 0
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
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SolEl = x /@ Range[M] /. fr // Sort;
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In[138]:=
```
SolEl - SolHer // Chop
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Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0.
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
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In[138]:=
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SolEl - SolHer // Chop
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Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=
```
{{Q → Function[{x},
    C[1] HermiteH[m, x] + C[2] Hypergeometric1F1[-m/2, 1/2, x^2]]}}
```

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Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

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Hermite Polynomials

In[136]:=
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SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
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In[138]:=
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SolEl - SolHer // Chop
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Out[138]=
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{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

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thursday 2.nb

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\ \text{HermiteH}[m, x] + C[2]\ \text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q
```

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thursday 2.nb

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\ \text{HermiteH}[m, x] + C[2]\ \text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_]
```

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thursday 2.nb

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\ \text{HermiteH}[m, x] + C[2]\ \text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → Hermite[
```

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thursday 2.nb

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

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thursday 2.nb

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=

$$2\,m\,\text{HermiteH}[m, x] - 2\,x\,Q'[x] + Q''[x]$$

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thursday 2.nb

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

x^2 +|

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=

$2\,m\,\text{HermiteH}[m, x] - 2\,x\,Q'[x] + Q''[x]$

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thursday 2.nb

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

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thursday 2.nb

```
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=

$$2\,m\,\text{HermiteH}[m, x] - 2\,x\,Q'[x] + Q''[x]$$

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thursday 2.nb

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=

$$2\,m\,\text{HermiteH}[m, x] - 2\,x\,Q'[x] + Q''[x]$$

```
Q'[x]
```

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thursday 2.nb

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

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thursday 2.nb

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

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thursday 2.nb

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=

```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=

```
f[2] + f[3]
```

In[145]:=

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=

```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=

```
Q'[x] // FullForm
```

Out[147]//FullForm=

```
Derivative[1][Q][x]
```

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

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thursday 2.nb

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=

```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=

```
f[2] + f[3]
```

In[145]:=

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=

$$2\,m\,\text{HermiteH}[m, x] - 2\,x\,Q'[x] + Q''[x]$$

In[147]:=

```
Q'[x] // FullForm
```

Out[147]//FullForm=

```
Derivative[1][Q][x]
```

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q -> [x_] → HermiteH[m, x]
```

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thursday 2.nb

Out[144]=
```
{{Q → Function[{x},
    C[1] HermiteH[m, x] + C[2] Hypergeometric1F1[-m/2, 1/2, x^2]]}}
```

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Her
```

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thursday 2.nb

Out[144]=
```
{{Q → Function[{x},
    C[1] HermiteH[m, x] + C[2] Hypergeometric1F1[-m/2, 1/2, x^2]]}}
```

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → HermiteH[m, #] &
```

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thursday 2.nb

```
In[146]:= x^2 + x^3 /. x^y_ → f[y]

Out[146]= f[2] + f[3]

In[145]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]

Out[145]= 2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]

In[147]:= Q'[x] // FullForm

Out[147]//FullForm=

Derivative[1][Q][x]

In[148]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &)

Out[148]= 4 (-1 + m) m HermiteH[-2 + m, x] -
  4 x m HermiteH[-1 + m, x] + 2 m HermiteH[m, x]
```

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thursday 2.nb

```
In[146]:= x^2 + x^3 /. x^y_ → f[y]

Out[146]= f[2] + f[3]

In[145]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]

Out[145]= 2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]

In[147]:= Q'[x] // FullForm

Out[147]//FullForm=

Derivative[1][Q][x]

In[149]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // Simplify

Out[149]= 2 m (2 (-1 + m) HermiteH[-2 + m, x] - 2 x HermiteH[-1 + m, x] + HermiteH[m, x])
```

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thursday 2.nb

```
In[146]:= x^2 + x^3 /. x^y_ → f[y]

Out[146]= f[2] + f[3]

In[145]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]

Out[145]= 2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]

In[147]:= Q'[x] // FullForm

Out[147]//FullForm=

Derivative[1][Q][x]

In[150]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify

Out[150]= 0
```

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thursday 2.nb

```
In[146]:= x^2 + x^3 /. x^y_ → f[y]

Out[146]= f[2] + f[3]

In[145]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]

Out[145]= 2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]

In[147]:= Q'[x] // FullForm

Out[147]//FullForm=

Derivative[1][Q][x]

In[150]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify

Out[150]= 0
```

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thursday 2.nb

```
In[146]:= x^2 + x^3 /. x^y_ → f[y]

Out[146]= f[2] + f[3]

In[145]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]

Out[145]= 2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]

In[147]:= Q'[x] // FullForm

Out[147]//FullForm=

Derivative[1][Q][x]

0 == Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) //
 FullSimplify

Out[150]= 0
```

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thursday 2.nb

```
In[146]:= x^2 + x^3 /. x^y_ → f[y]

Out[146]= f[2] + f[3]

In[145]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]

Out[145]= 2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]

In[147]:= Q'[x] // FullForm

Out[147]//FullForm=

Derivative[1][Q][x]

In[151]:= 0 == Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) //
 FullSimplify

Out[151]= True
```

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thursday 2.nb

```
In[146]:= x^2 + x^3 /. x^y_ → f[y]

Out[146]= f[2] + f[3]

In[145]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]

Out[145]= 2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]

In[147]:= Q'[x] // FullForm

Out[147]//FullForm=

Derivative[1][Q][x]

In[152]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify

Out[152]= 0
```

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thursday 2.nb

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```
Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

```
f''[x] +
```

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thursday 2.nb

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```
Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

```
f''[x] + ω^2 f[x]
```

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thursday 2.nb

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```
Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

```
f''[x] + ω^2 f[x] /. f → A Sin[B #] &
```

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thursday 2.nb

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```
Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

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thursday 2.nb

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

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thursday 2.nb

```
Out[146]= f[2] + f[3]

In[145]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]

Out[145]= 2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]

In[147]:= Q'[x] // FullForm

Out[147]//FullForm=
Derivative[1][Q][x]

In[152]:= Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify

Out[152]= 0

In[153]:= f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)

Out[153]= -A B^2 Sin[B x] + A ω^2 Sin[B x]
```

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thursday 2.nb

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

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thursday 2.nb

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```
Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About

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thursday 2.nb

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```
Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplif

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thursday 2.nb

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```
Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplify and FullSimplify

```
Simpoi
```

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thursday 2.nb

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```
Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplify and FullSimplify

```
Simplify[Exp[
```

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thursday 2.nb

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```
Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplify and FullSimplify

```
Simplify[Exp[I x] + Exp[-I x]]
```

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thursday 2.nb

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
$$-A B^2 \mathrm{Sin}[B x] + A \omega^2 \mathrm{Sin}[B x]$$

About Simplify and FullSimplify

In[154]:=
```
Simplify[Exp[I x] + Exp[-I x]]
```

Out[154]=
$$e^{-i x} + e^{i x}$$

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thursday 2.nb

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
$$-A B^2 \mathrm{Sin}[B x] + A \omega^2 \mathrm{Sin}[B x]$$

About Simplify and FullSimplify

In[155]:=
```
FullSimplify[Exp[I x] + Exp[-I x]]
```

Out[155]=
```
2 Cos[x]
```

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thursday 2.nb

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplify and FullSimplify

In[155]:=
```
FullSimplify[Exp[I x] + Exp[-I x]]
```

Out[155]=
```
2 Cos[x]
```

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thursday 2.nb

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplify and FullSimplify

In[155]:=
```
FullSimplify[Exp[I x] + Exp[-I x]]
```

Out[155]=
```
2 Cos[x]
```

```
Exp[I x] + Exp[-I x]
```

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thursday 2.nb

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```
Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplify and FullSimplify

In[155]:=
```
FullSimplify[Exp[I x] + Exp[-I x]]
```
Out[155]=
```
2 Cos[x]
```

In[156]:=
```
Exp[I x] + Exp[-I x] // FullForm
```
Out[156]//FullForm=
```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

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thursday 2.nb

Out[152]= 0

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]= $-A B^2 \text{Sin}[B x] + A \omega^2 \text{Sin}[B x]$

About Simplify and FullSimplify

In[155]:=
```
FullSimplify[Exp[I x] + Exp[-I x]]
```

Out[155]= 2 Cos[x]

In[156]:=
```
Exp[I x] + Exp[-I x] // FullForm
```

Out[156]//FullForm=
```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

```
Exp[I x] + Exp[-I x] // FullForm
```

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thursday 2.nb

Out[152]= 0

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]= $-A B^2 \text{Sin}[B x] + A \omega^2 \text{Sin}[B x]$

About Simplify and FullSimplify

In[155]:=
```
FullSimplify[Exp[I x] + Exp[-I x]]
```

Out[155]= 2 Cos[x]

In[156]:=
```
Exp[I x] + Exp[-I x] // FullForm
```

Out[156]//FullForm=
```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

```
Exp[I x] + Exp[-I x] // FullForm
```

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thursday 2.nb

Out[152]= 0

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]= $-A B^2 \text{Sin}[B x] + A \omega^2 \text{Sin}[B x]$

About Simplify and FullSimplify

In[155]:=
```
FullSimplify[Exp[I x] + Exp[-I x]]
```

Out[155]= 2 Cos[x]

In[156]:=
```
Exp[I x] + Exp[-I x] // FullForm
```

Out[156]//FullForm=
```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

```
Exp[I x] + Exp[-I x] // Tr
```

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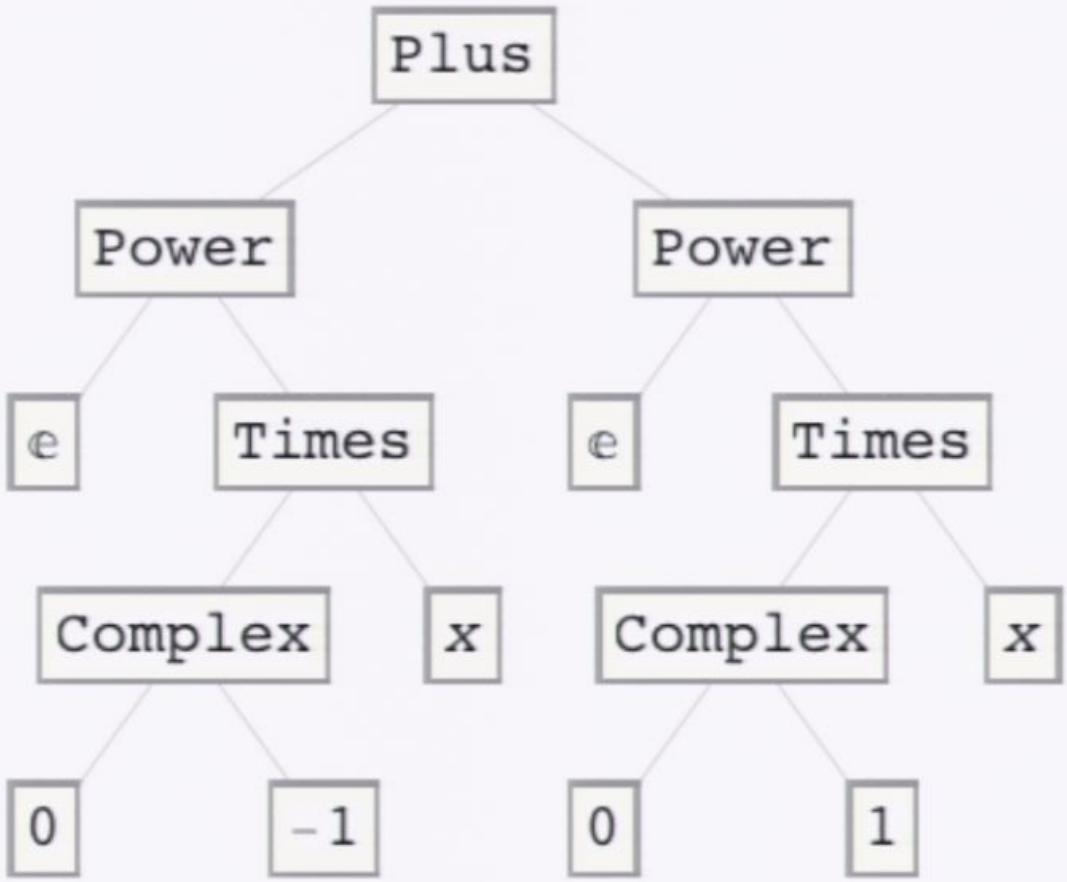
thursday 2.nb

In[157]:=
```
Exp[I x] + Exp[-I x] // TreeForm
```

Out[157]//TreeForm=



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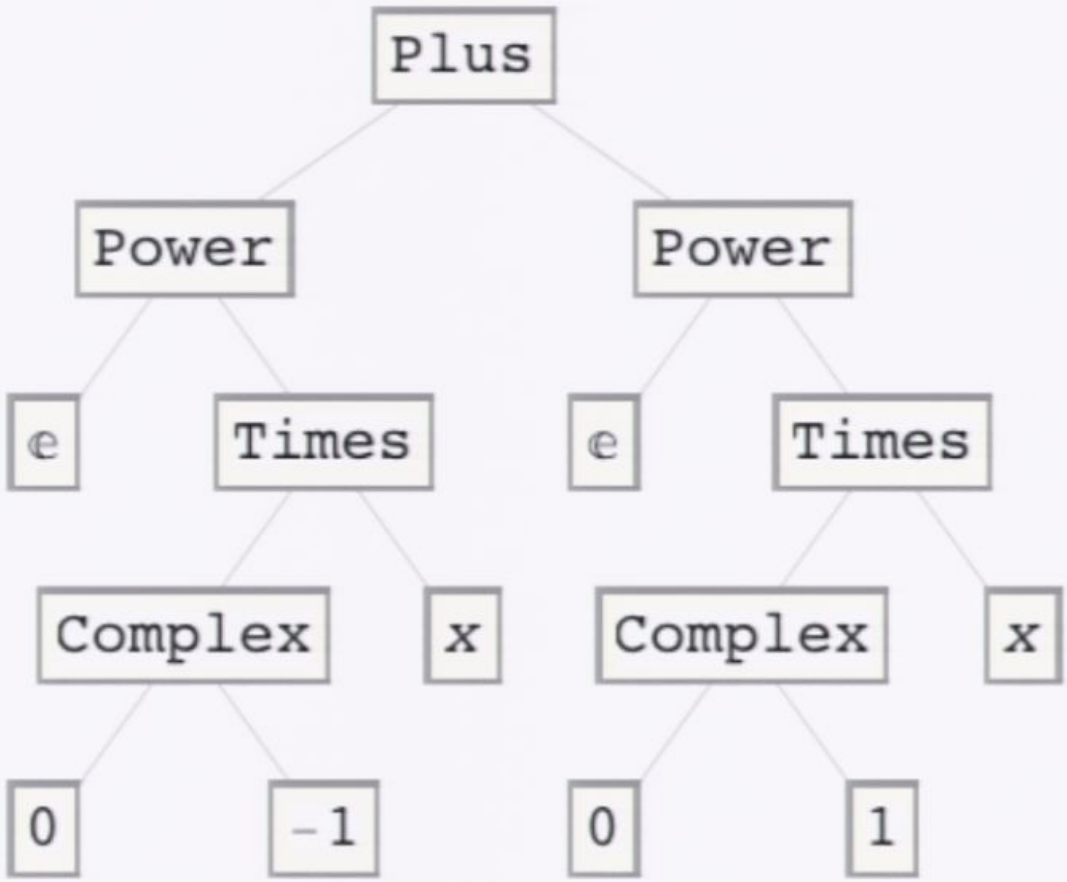
thursday 2.nb

t[157]//TreeForm=



FullSi

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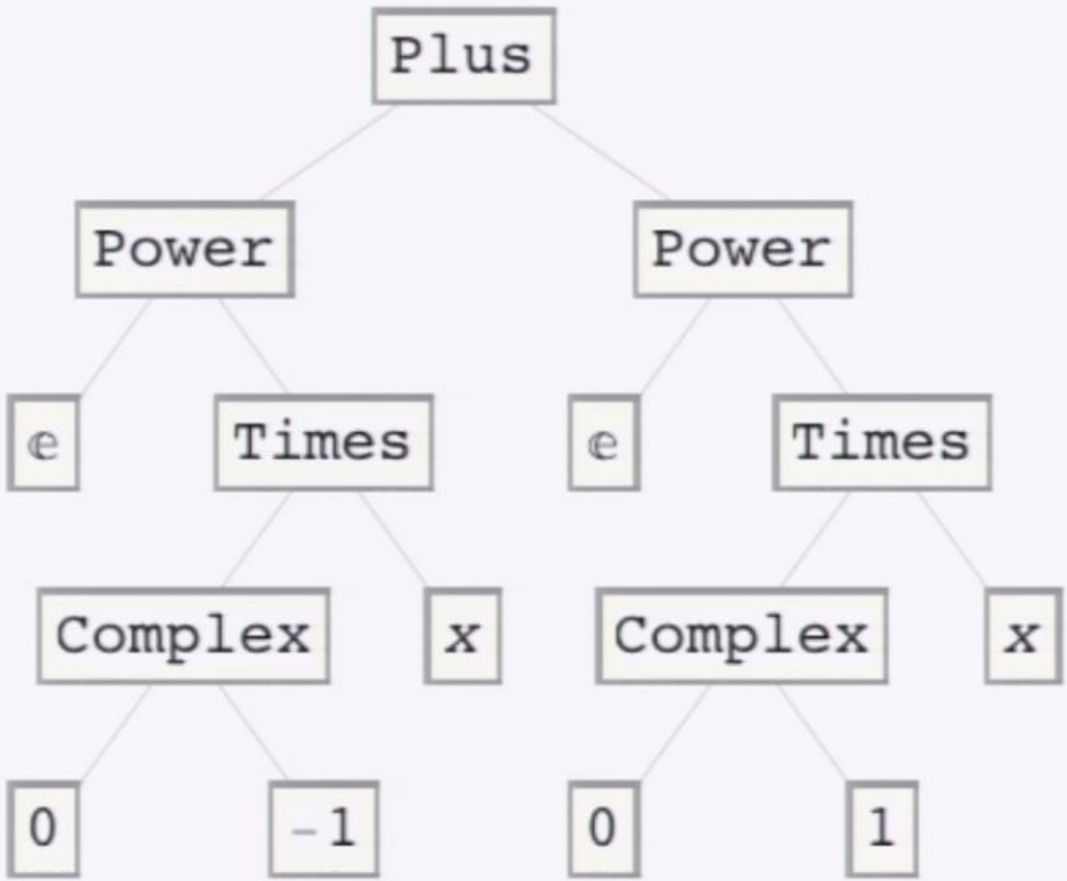
thursday 2.nb

t[157]//TreeForm=




```
FullSimplify[Exp[I x] + Exp[-I x]]
```

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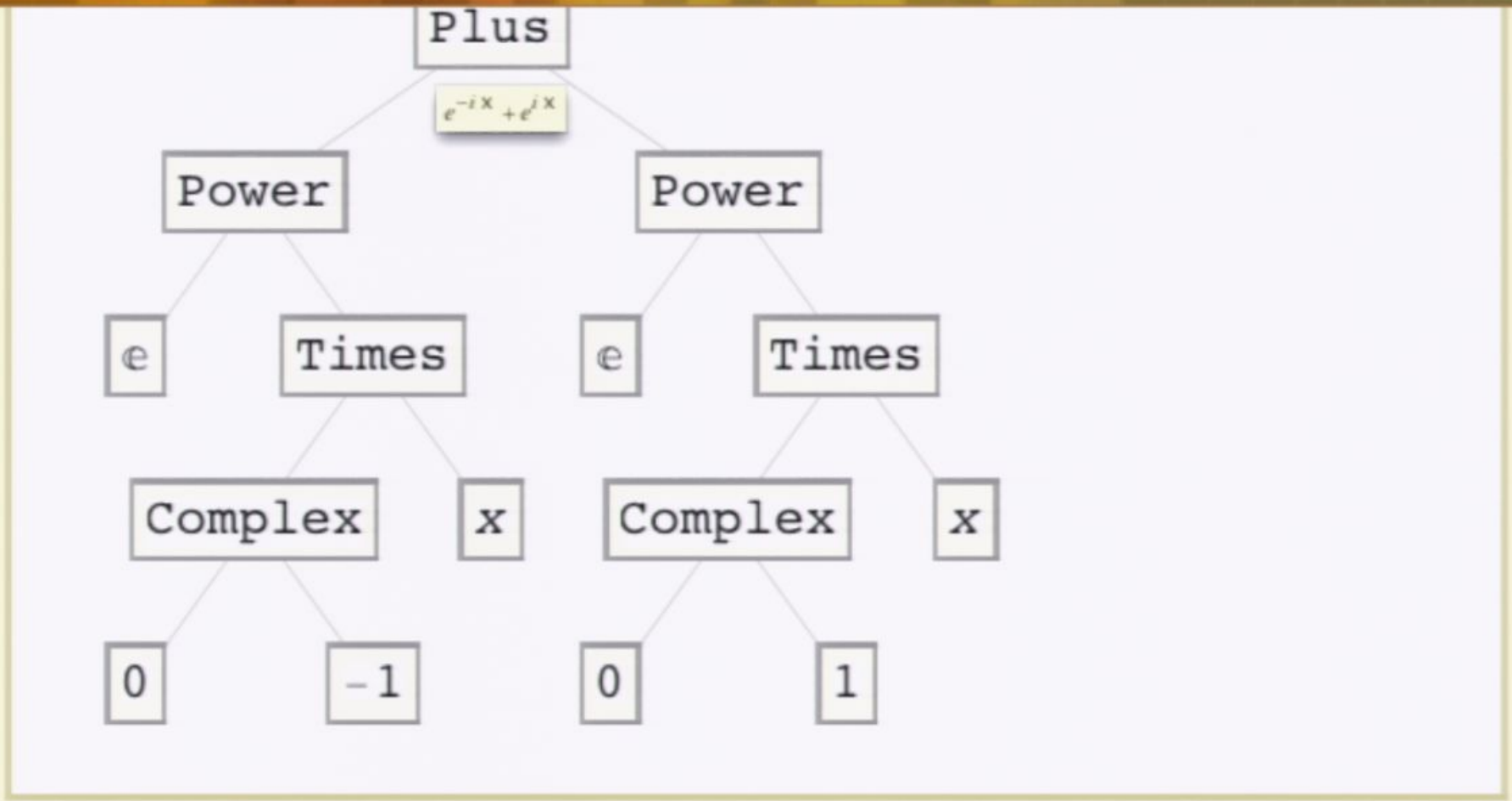
thursday 2.nb



In[158]:=
```
FullSimplify[Exp[I x] + Exp[-I x]]
```

Out[158]=
```
2 Cos[x]
```

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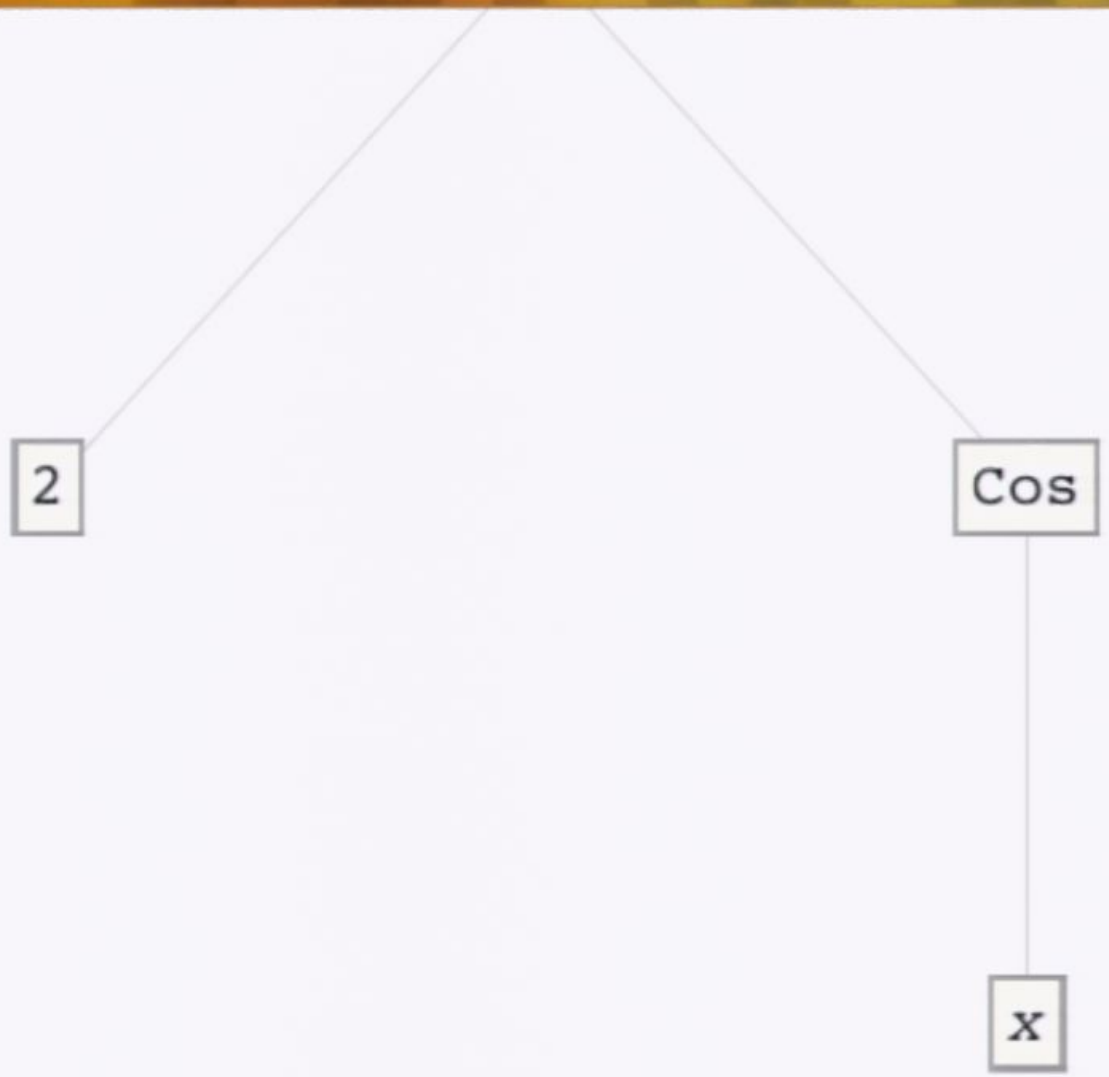
thursday 2.nb



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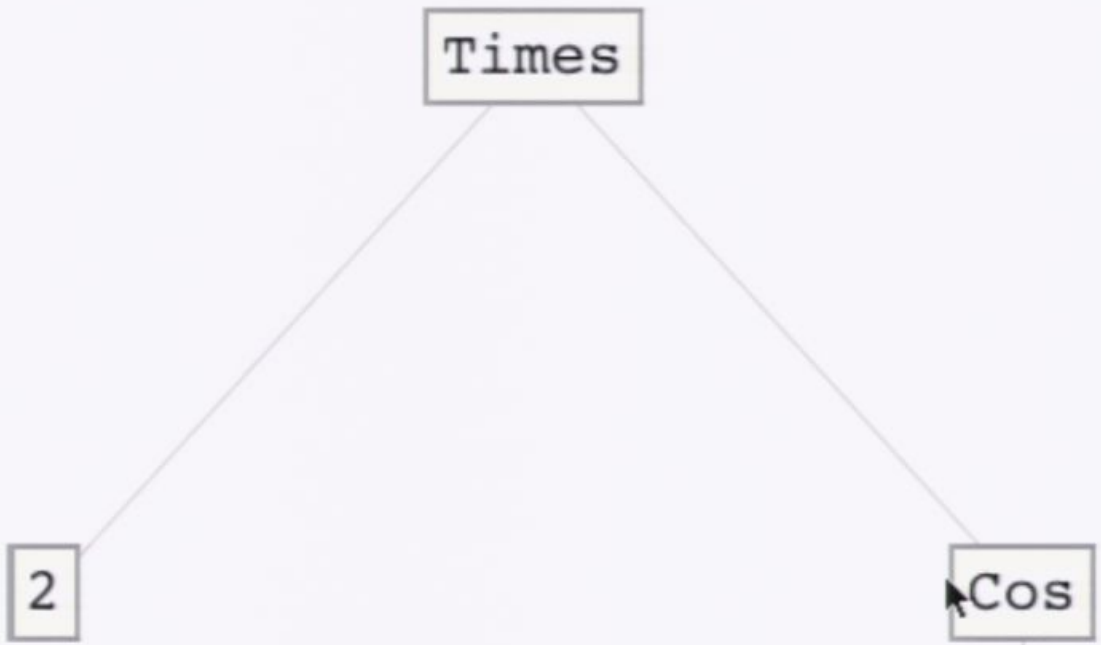
thursday 2.nb

t[159]//TreeForm=

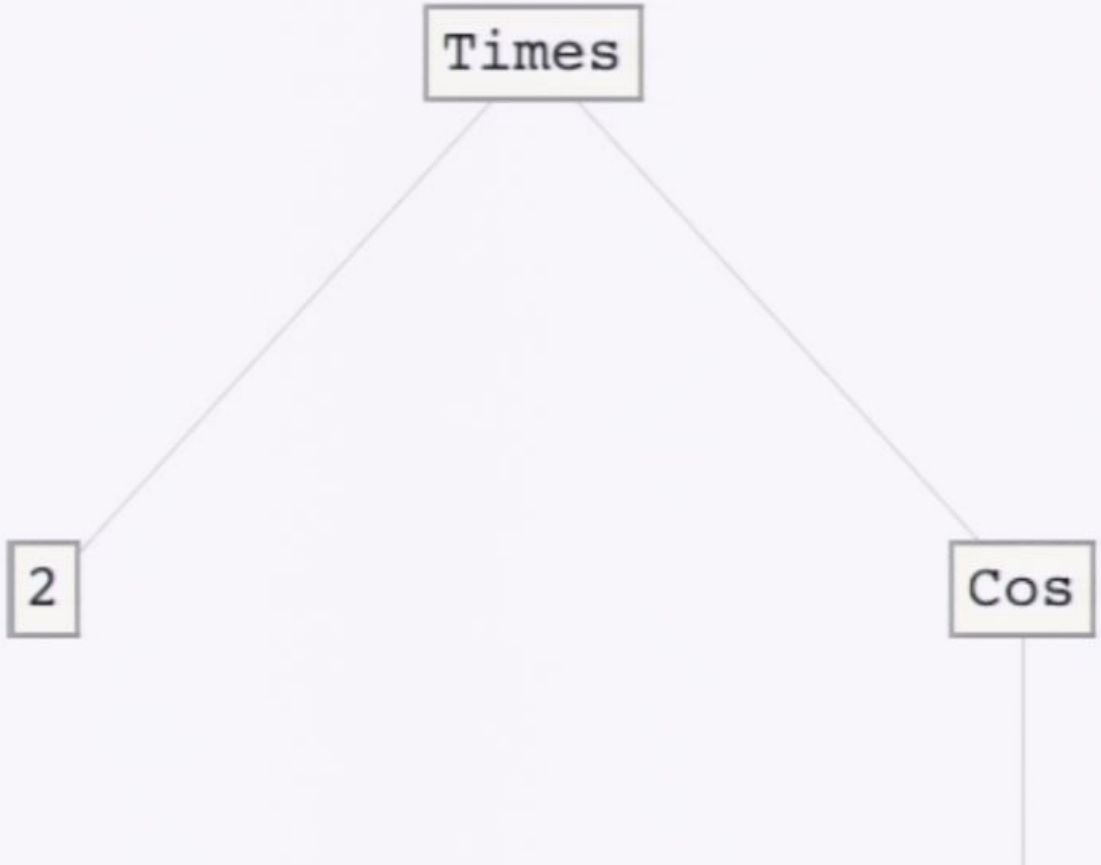


Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

In[159]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

Out[159]//TreeForm=



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thursday 2.nb

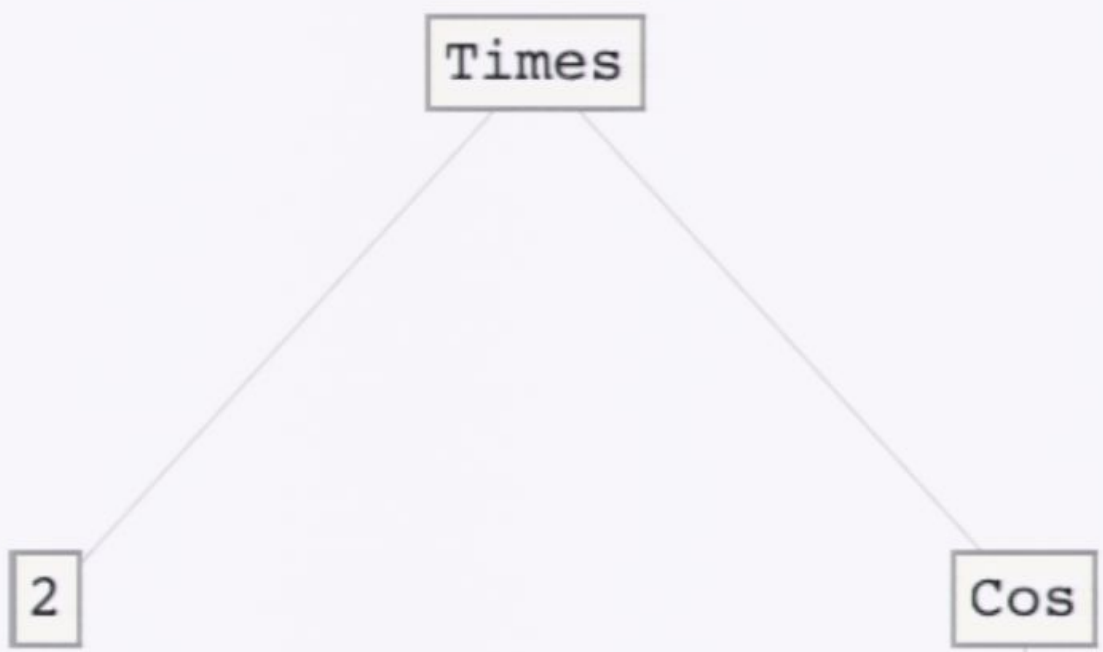
0 -1 0 1

```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

In[159]:=

```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

Out[159]//TreeForm=



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thursday 2.nb

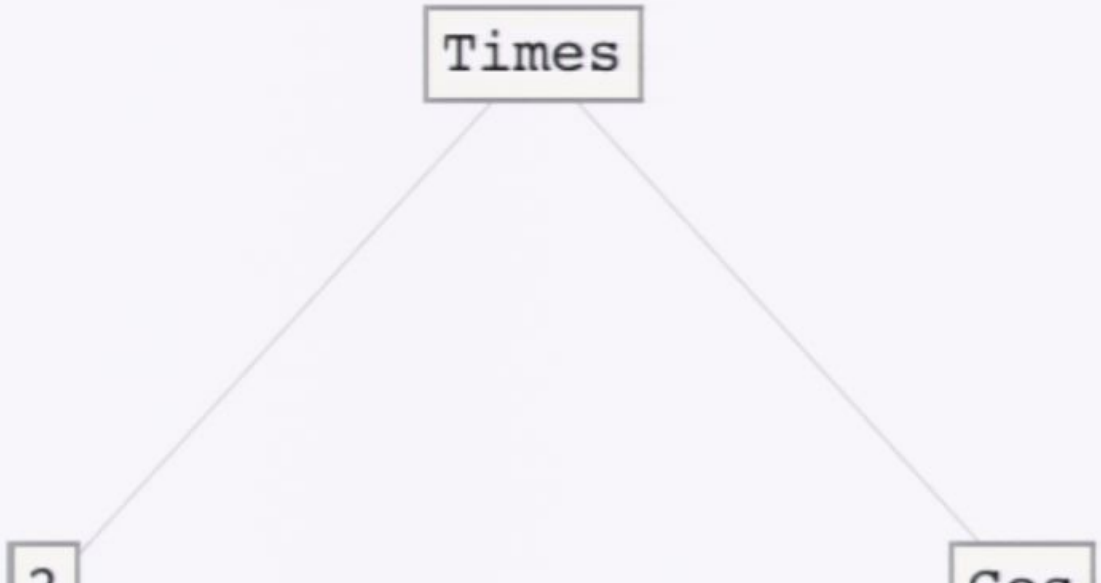
0 -1 0 1

In[160]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // LeafCount
```

Out[160]=
```
4
```

In[159]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

Out[159]//TreeForm=



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thursday 2.nb

```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

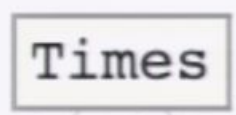
In[157]:=
```
Exp[I x] + Exp[-I x] // TreeForm
```

In[160]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // LeafCount
```

Out[160]=
```
4
```

In[159]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

Out[159]//TreeForm=



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thursday 2.nb

```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

In[157]:=
```
Exp[I x] + Exp[-I x] // TreeForm
```

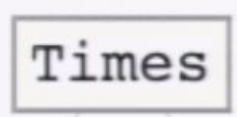
```
Exp[I x] + Exp[-I x] // Le
```

In[160]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // LeafCount
```

Out[160]=
```
4
```

In[159]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

Out[159]//TreeForm=



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thursday 2.nb

```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

In[157]:=
```
Exp[I x] + Exp[-I x] // TreeForm
```

In[161]:=
```
Exp[I x] + Exp[-I x] // LeafCount
```

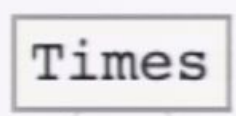
Out[161]=
```
15
```

In[160]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // LeafCount
```

Out[160]=
```
4
```

In[159]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

Out[159]//TreeForm=



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thursday 2.nb

```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

In[157]:=
```
Exp[I x] + Exp[-I x] // TreeForm
```

In[161]:=
```
Exp[I x] + Exp[-I x] // LeafCount
```

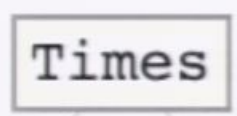
Out[161]=
```
15
```

In[160]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // LeafCount
```

Out[160]=
```
4
```

In[159]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

Out[159]//TreeForm=



Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

In[157]:=
```
Exp[I x] + Exp[-I x] // TreeForm
```

In[161]:=
```
Exp[I x] + Exp[-I x] // LeafCount
```

Out[161]=
```
15
```

In[160]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // LeafCount
```

Out[160]=
```
4
```

$\sqrt{\square}$

In[159]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

Out[159]//TreeForm=

Times

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thursday 2.nb

```
Plus[Power[E, Times[Complex[0, -1], x]],
 Power[E, Times[Complex[0, 1], x]]]
```

In[157]:=
```
Exp[I x] + Exp[-I x] // TreeForm
```

In[161]:=
```
Exp[I x] + Exp[-I x] // LeafCount
```

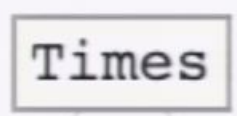
Out[161]=
```
15
```

In[160]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // LeafCount
```

Out[160]=
```
4
```

In[159]:=
```
FullSimplify[Exp[I x] + Exp[-I x]] // TreeForm
```

Out[159]//TreeForm=



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thursday 2.nb

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplify and FullSimplify

In[155]:=
```
FullSimplify[Exp[I x] + Exp[-I x]]
```

Out[155]=
```
2 Cos[x]
```


In[156]:=
```
Exp[I x] + Exp[-I x] // FullForm
```

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thursday 2.nb

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplify and FullSimplify

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thursday 2.nb

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```
Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

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thursday 2.nb

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```
Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```
Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

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thursday 2.nb

```
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

Check differential equations

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thursday 2.nb

```
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- Check differential equations
- From the equation |

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thursday 2.nb

```
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- Check differential equations
- From the equation for Q(x) to the equation

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thursday 2.nb

```
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- **Check differential equations**
- **From the equation for Q(x) to the equation for G(x)**

```
Q''[x] - 2 x Q'[x] + 2 m Q[x]
```

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thursday 2.nb

```
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- **Check differential equations**
- **From the equation for Q(x) to the equation for G(x)**

In[162]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x]
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

In[162]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x]
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

In[162]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x]
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q →
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[ ∫
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[ ∫
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

```
int
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[ ∫
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫G[x_]
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

```
∫
```

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thursday 2.nb

In[118]:=
```
eqs /. ir // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫G[x_]
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

```
∫|
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫G[x_]
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

In[163]:=
```
∫_x^x G[y] dy
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫G[x_]
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

```
∫G[y] dy
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫G[x_]
```

Out[162]=
```
2 m Q[x] - 2 x Q'[x] + Q''[x]
```

In[163]:=
```
∫G[y] dy
```

Out[163]=
```
∫G[y] dy
```

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫G[x_]
```

Out[162]= $2\,m\,Q[x] - 2\,x\,Q'[x] + Q''[x]$

In[163]:=
```
∫G[y] dy
```

Out[163]= $\int G[y]\,dy$

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫G[x_]
```

Out[162]= $2\,m\,Q[x] - 2\,x\,Q'[x] + Q''[x]$

$$\int_{0|} G[y]\,dy$$

Out[163]= $\int G[y]\,dy$

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫G[x_]
```

Out[162]= $2\,m\,Q[x] - 2\,x\,Q'[x] + Q''[x]$

$$\int_0^{\square} G[y]\,dy$$

Out[163]= $\int G[y]\,dy$

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫G[x_]
```

Out[162]= $2\,m\,Q[x] - 2\,x\,Q'[x] + Q''[x]$

In[164]:= $\int_0^x G[y]\,dy$

Out[164]= $\int_0^x G[y]\,dy$

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫_0| G[x_]
```

Out[162]= $2\,m\,Q[x] - 2\,x\,Q'[x] + Q''[x]$

In[164]:= $\int_0^x G[y]\,dy$

Out[164]= $\int_0^x G[y]\,dy$

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

In[118]:= `eqs /. fr // Chop; (* check of equations *)`

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

$$Q''[x] - 2\,x\,Q'[x] + 2\,m\,Q[x] \;/.\; Q \to \mathrm{Exp}\left[\int_0^x G[x\_]\right.$$

Out[162]= $2\,m\,Q[x] - 2\,x\,Q'[x] + Q''[x]$

In[164]:= $\int_0^x G[y]\,dy$

Out[164]= $\int_0^x G[y]\,dy$

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thursday 2.nb

In[118]:= `eqs /. fr // Chop; (* check of equations *)`

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

$$Q''[x] - 2\,x\,Q'[x] + 2\,m\,Q[x] \;/.\; Q \to \mathrm{Exp}\left[\int_0^x G[y]\, d\right.$$

Out[162]= $2\,m\,Q[x] - 2\,x\,Q'[x] + Q''[x]$

In[164]:= $\int_0^x G[y]\, dy$

Out[164]= $\int_0^x G[y]\, dy$

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thursday 2.nb

In[118]:=
```
eqs /. ir // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → Exp[∫_0^# G[y] dy]
```

Out[162]= $2\,m\,Q[x] - 2\,x\,Q'[x] + Q''[x]$

In[164]:= $\int_0^x G[y]\,dy$

Out[164]= $\int_0^x G[y]\,dy$

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (Exp[∫_0^# G[y] dy] &)
```

Out[162]= $2\,m\,Q[x] - 2\,x\,Q'[x] + Q''[x]$

In[164]:= $\int_0^x G[y]\,dy$

Out[164]= $\int_0^x G[y]\,dy$

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thursday 2.nb

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

In[165]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (Exp[∫_0^# G[y] dy] &) // FullSimplify
```

Out[165]= $e^{\int_0^x G[y]\,dy}\left(2m - 2x\,G[x] + G[x]^2 + G'[x]\right)$

In[164]:=
```
∫_0^x G[y] dy
```

Out[164]= $\int_0^x G[y]\,dy$

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thursday 2.nb

In[118]:=
```
eqs /. ir // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

In[165]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (Exp[∫_0^# G[y] dy] &) // FullSimplify
```

Out[165]= $e^{\int_0^x G[y]\,dy}\left(2\,m - 2\,x\,G[x] + G[x]^2 + G'[x]\right)$

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thursday 2.nb

- Solving the equations

In[115]:=
```
vars = {x[#], # - M / 2} & /@ Range[M];
```

$$\text{eqs} = x[\#] - \sum_{k=1}^{M} \text{If}\left[\# == k,\ 0,\ \frac{1}{x[\#] - x[k]}\right] \ \&\ /@\ \text{Range}[M];$$

In[117]:=
```
fr = FindRoot[eqs, vars];
```

In[118]:=
```
eqs /. fr // Chop; (* check of equations *)
```

- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

In[165]:=

$$Q''[x] - 2\,x\,Q'[x] + 2\,m\,Q[x]\ /.\ Q \to \left(\text{Exp}\left[\int_0^{\#} G[y]\,dy\right]\ \&\right)\ //\ \text{FullSimplify}$$

Out[165]=

$$e^{\int_0^x G[y]\,dy}\left(2\,m - 2\,x\,G[x] + G[x]^2 + G'[x]\right)$$

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thursday 2.nb

In[114]:=
```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

In[165]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (Exp[∫_0^# G[y] dy] &) // FullSimplify
```

Out[165]=

$$e^{\int_0^x G[y]\,dy}\left(2\,m - 2\,x\,G[x] + G[x]^2 + G'[x]\right)$$

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thursday 2.nb

In[114]:=
```
M = 100;
```

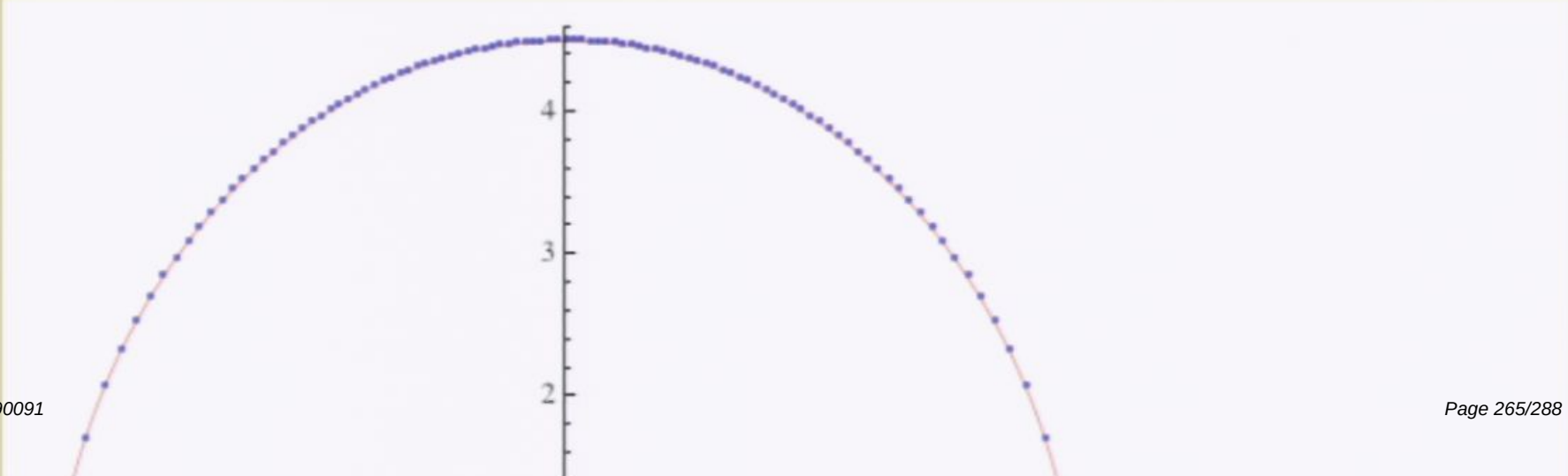
- Solving the equations
- Check of density

In[120]:=
```
lp = {(x[# + 1] + x[#])/2, 1/(x[# + 1] - x[#])} & /@ Range[M - 1] /. fr // ListPlot;
```

$$\text{pl} = \text{Plot}\left[\frac{\sqrt{2\,M - x^2}}{\pi}, \left\{x, -\sqrt{2\,M}, \sqrt{2\,M}\right\}, \text{PlotStyle} \to \text{Red}\right];$$

In[122]:=
```
Show[pl, lp]
```

Out[122]=



Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

In[114]:=
```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

In[165]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (Exp[∫_0^# G[y] dy] &) // FullSimplify
```

Out[165]=

$$e^{\int_0^x G[y]\,dy}\left(2\,m - 2\,x\,G[x] + G[x]^2 + G'[x]\right)$$

Mathematica File Edit Insert Format Cell Graphics Evaluation Palettes Window Help

thursday 2.nb

In[114]:=
```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials

In[136]:=
```
SolHer = x /. NSolve[HermiteH[M, x] == 0, x, WorkingPrecision → 100] //
   Sort;
SolEl = x /@ Range[M] /. fr // Sort;
```

In[138]:=
```
SolEl - SolHer // Chop
```

Out[138]=
```
{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
```

- Check differential equations
- From the equation for Q(x) to the equation for G(x)

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thursday 2.nb

In[114]:=
```
M = 100;
```

- Solving the equations
- Check of density
- Hermite Polynomials
- Check differential equations
- From the equation for Q(x) to the equation for G(x)

In[165]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (Exp[∫_0^# G[y] dy] &) // FullSimplify
```

Out[165]=

$$e^{\int_0^x G[y]\,dy}\left(2\,m - 2\,x\,G[x] + G[x]^2 + G'[x]\right)$$

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thursday 2.nb

- Check of density
- Hermite Polynomials
- Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\},\ C[1]\ \text{HermiteH}[m, x] + C[2]\ \text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```

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thursday 2.nb

```
C[1] HermiteH[m, x] + C[2] Hypergeometric1F1[-m/2, 1/2, x^2]]}}
```

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

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thursday 2.nb

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

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thursday 2.nb

Check differential equations

In[144]:=
```
DSolve[Q''[x] - 2 x Q'[x] + 2 m Q[x] == 0, Q, x]
```

Out[144]=

$$\left\{\left\{Q \to \text{Function}\left[\{x\}, C[1]\,\text{HermiteH}[m, x] + C[2]\,\text{Hypergeometric1F1}\left[-\frac{m}{2}, \frac{1}{2}, x^2\right]\right]\right\}\right\}$$

In[146]:=
```
x^2 + x^3 /. x^y_ → f[y]
```

Out[146]=
```
f[2] + f[3]
```

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q'[x] + Q''[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

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thursday 2.nb

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```
Out[145]=
```
2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]
```

In[147]:=
```
Q'[x] // FullForm
```
Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &)
```
Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```
Out[153]=
$$-A B^2 \mathrm{Sin}[B x] + A \omega^2 \mathrm{Sin}[B x]$$

Cut
Copy
Paste
Copy As

Merge Cells
Ungroup Cells

Open/Close Group
Open All Subgroups
Close All Subgroups

Evaluate Cells

About Simplify and FullSimplify

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thursday 2.nb

In[145]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q[x_] → HermiteH[m, x]
```

Out[145]=
```
2 m HermiteH[m, x] - 2 x Q′[x] + Q″[x]
```

In[147]:=
```
Q'[x] // FullForm
```

Out[147]//FullForm=
```
Derivative[1][Q][x]
```

In[152]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (HermiteH[m, #] &) // FullSimplify
```

Out[152]=
```
0
```

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
```
-A B^2 Sin[B x] + A ω^2 Sin[B x]
```

About Simplify and FullSimplify

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thursday 2.nb

Out[153]= $-A B^2 \operatorname{Sin}[B x] + A \omega^2 \operatorname{Sin}[B x]$

About Simplify and FullSimplify

From the equation for Q(x) to the equation for G(x)

In[165]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (Exp[∫_0^# G[y] dy] &) // FullSimplify
```

Out[165]= $e^{\int_0^x G[y]\, dy} \left(2 m - 2 x G[x] + G[x]^2 + G'[x]\right)$

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thursday 2.nb

In[153]:=
```
f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
```

Out[153]=
$$-A B^2 \operatorname{Sin}[B x] + A \omega^2 \operatorname{Sin}[B x]$$

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```

Out[165]=
$$e^{\int_0^x G[y]\,dy} \left(2 m - 2 x G[x] + G[x]^2 + G'[x]\right)$$

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In[153]:=
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thursday 2.nb

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thursday 2.nb

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thursday 2.nb

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```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (x nf Exp[∫_0^# G[y] dy] &) //FullSimplify
```

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thursday 2.nb

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f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
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```

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thursday 2.nb

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thursday 2.nb

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```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (x ↦ Exp[∫_0^# G[y] dy] &) //
 FullSimplify
```

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thursday 2.nb

In[153]:=
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f''[x] + ω^2 f[x] /. f → (A Sin[B #] &)
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About Simplify and FullSimplify

From the equation for Q(x) to the equation for G(x)

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```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (x ↦ Exp[∫_0^x G[y] dy] &) //
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```

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thursday 2.nb

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About Simplify and FullSimplify

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```

Out[165]=
$$e^{\int_0^x G[y]\,dy} \left(2 m - 2 x G[x] + G[x]^2 + G'[x]\right)$$

In[166]:=
```
Q''[x] - 2 x Q'[x] + 2 m Q[x] /. Q → (x ↦ Exp[∫_0^x G[y] dy]) //
 FullSimplify
```

Out[166]=
$$e^{\int_0^x G[y]\,dy} \left(2 m - 2 x G[x] + G[x]^2 + G'[x]\right)$$