

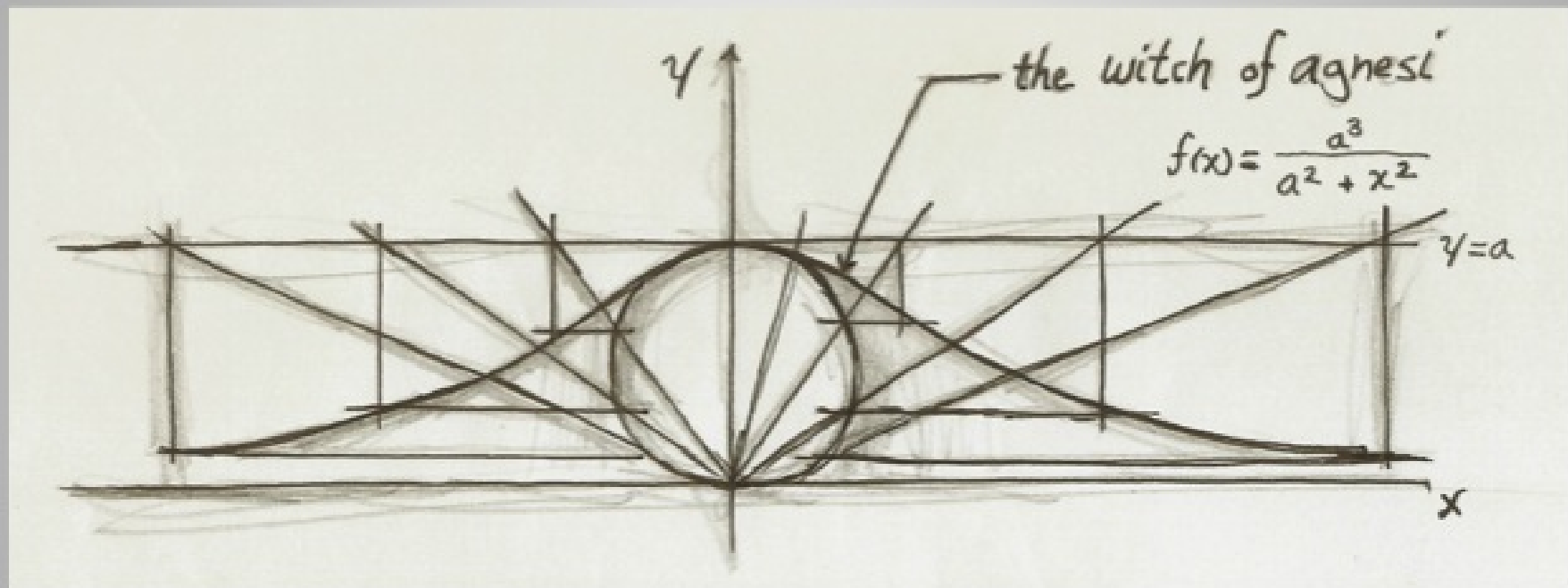
Title: Dangerous Curves: How I Learned To Stop Worrying and Love the Calculus

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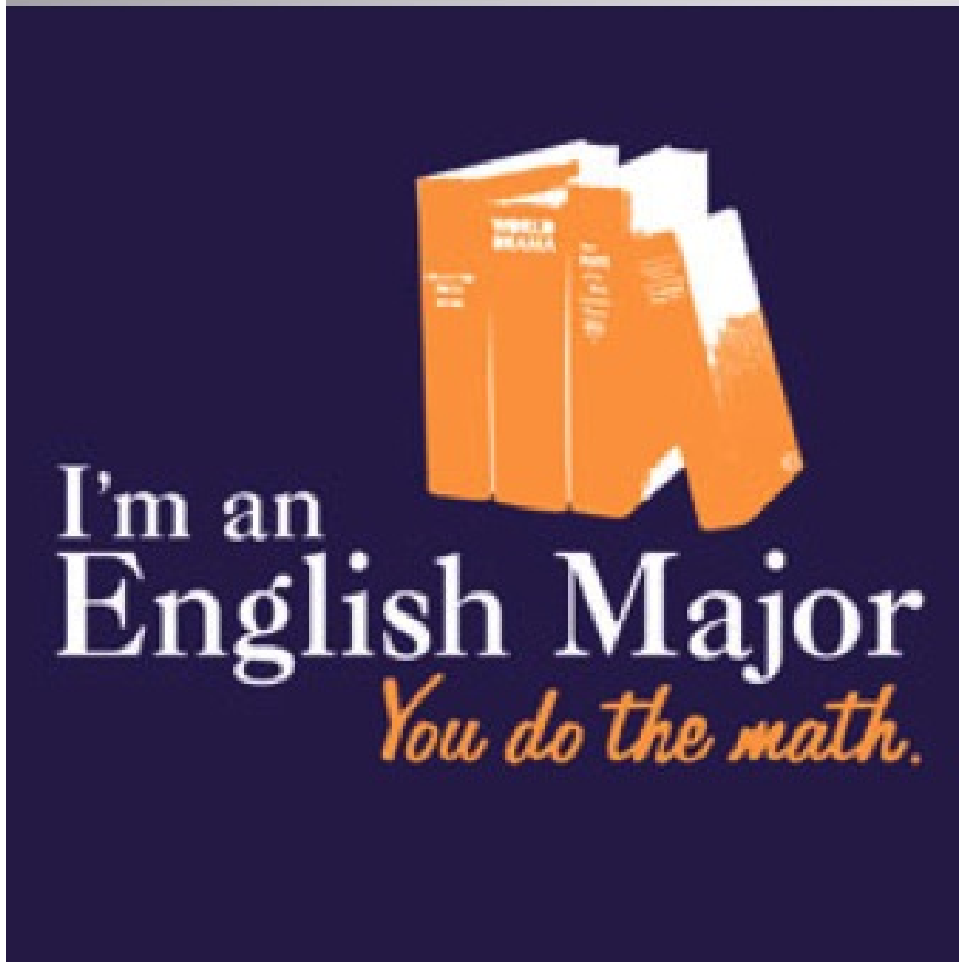
Abstract: Based on her book, The Calculus Diaries, join, Jennifer Ouellette as she shows how calculus can be applied to everything from gas mileage, diet, the rides at Disneyland, surfing in Hawaii, shooting craps in Vegas and warding off zombies. Even the mathematically challenged, can-and-should learn the fundamentals of the universal language.

DANGEROUS CURVES



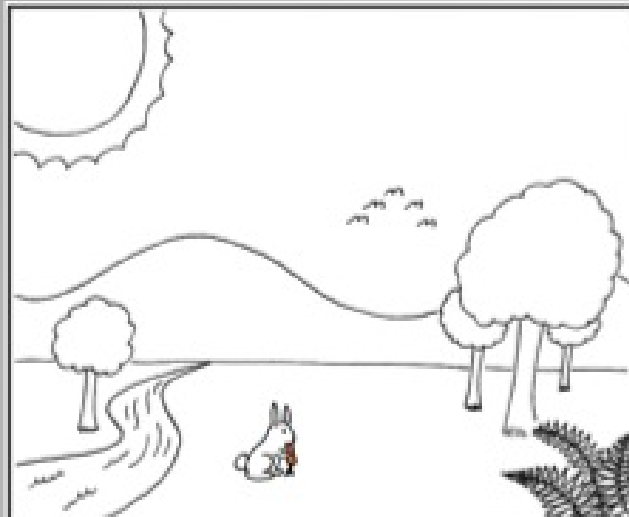
How I Learned To Stop Worrying and
Love the Calculus

This was me:

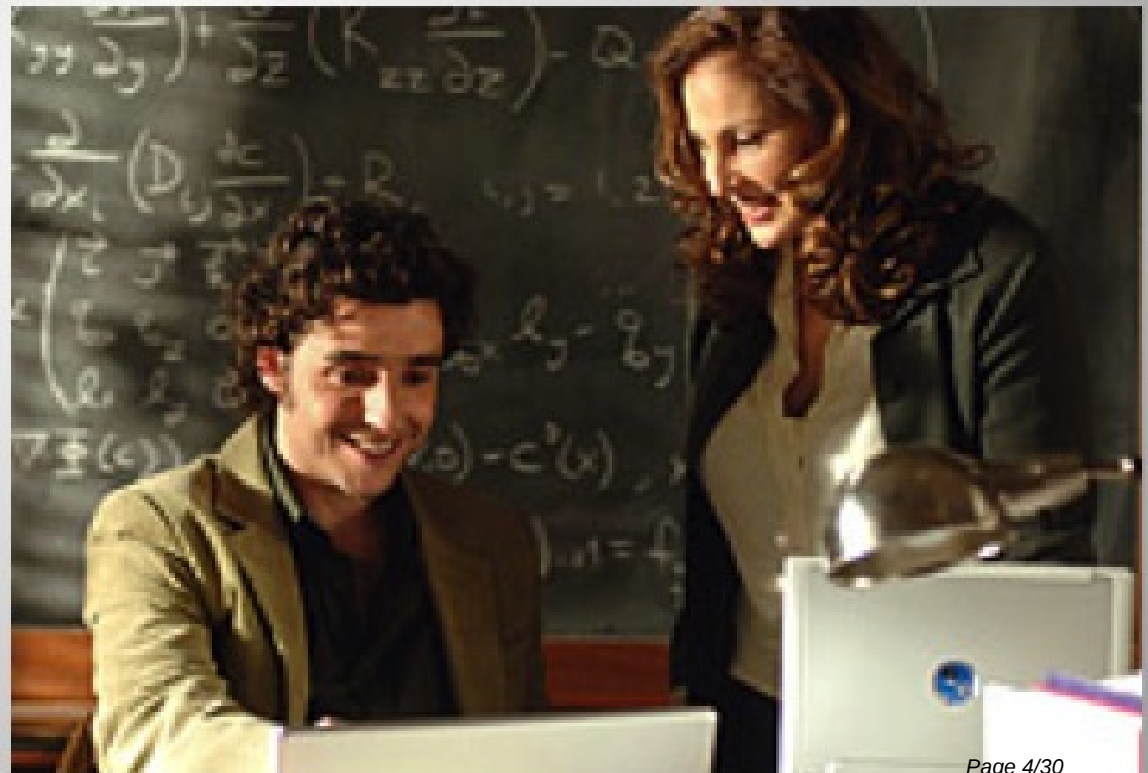


Math is All Around Us

Calculus = change and motion

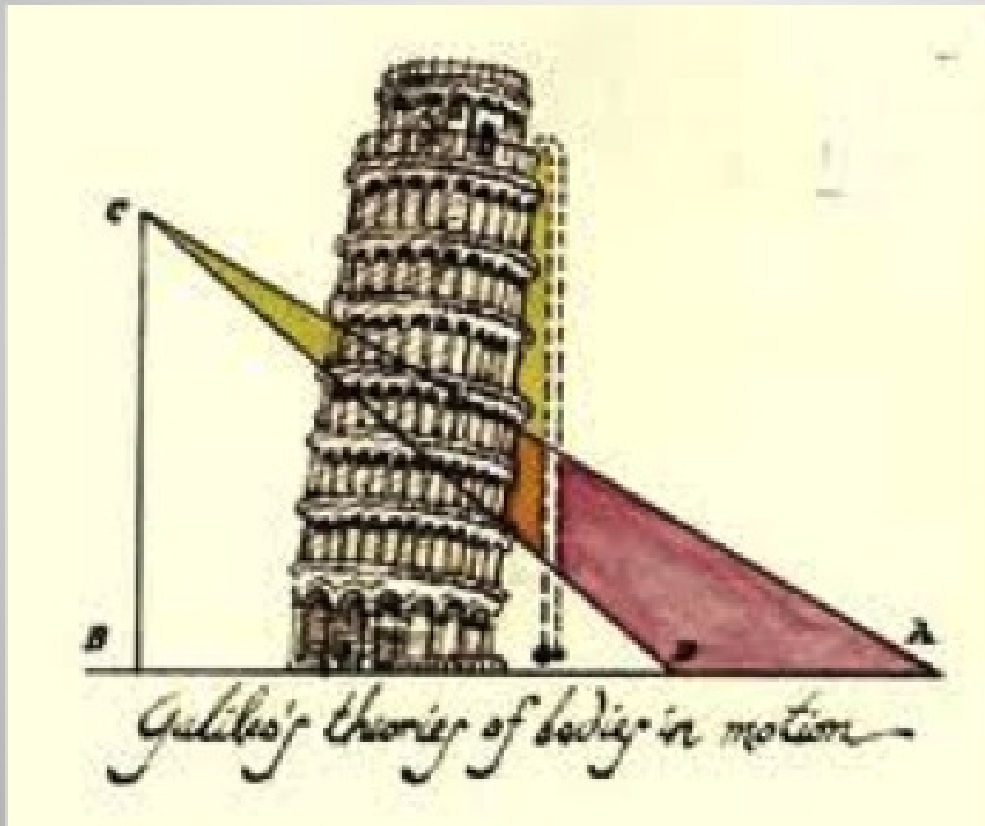


This is how scientists see the world.



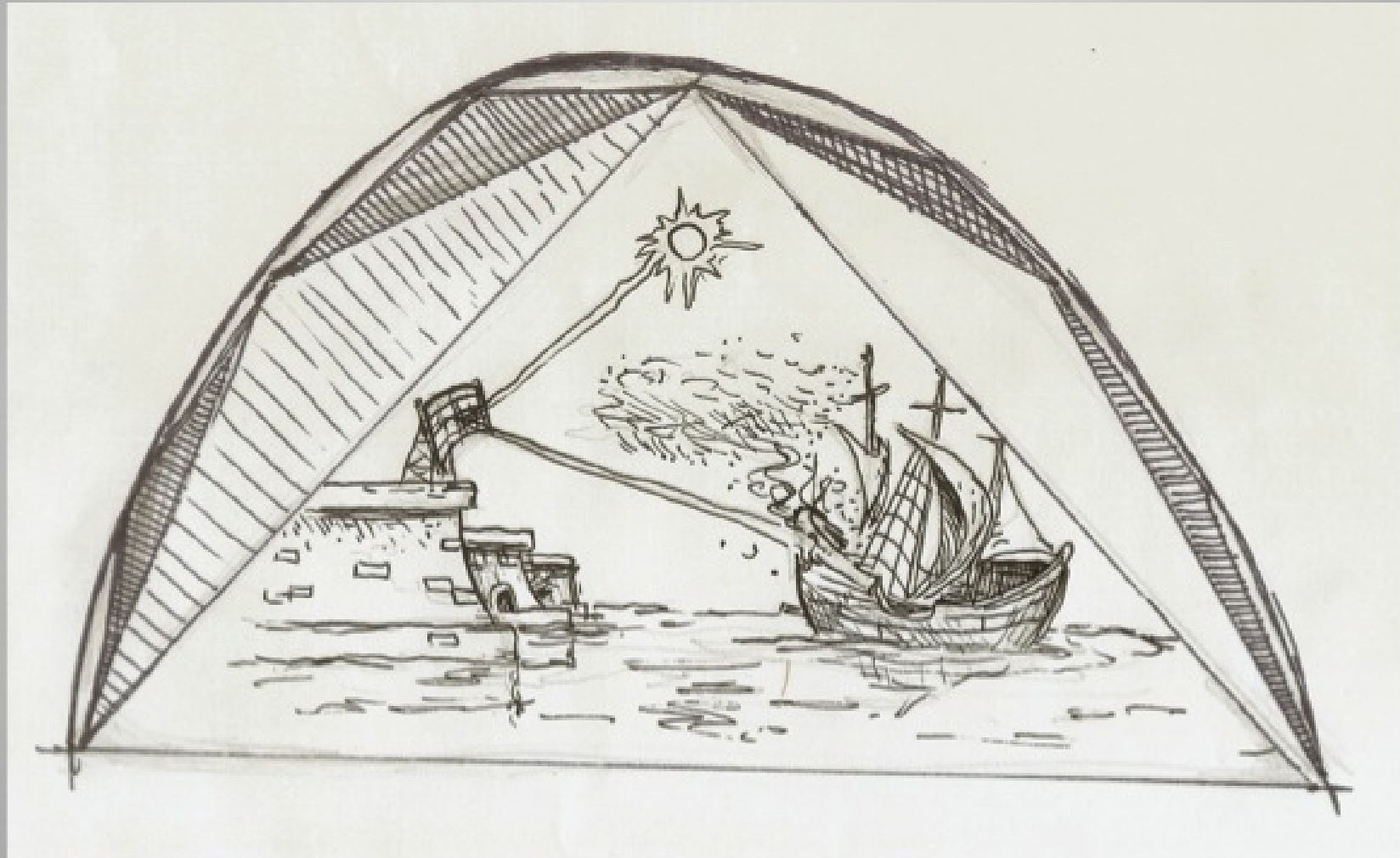
Math Can Reveal Hidden Truths

EG: Objects fall at same rate, regardless of mass



$$g = \frac{GM}{r^2}$$

Archimedes and Problem of Curves



Vdara Hotel a Giant Death Ray



Roman Contribution to Math



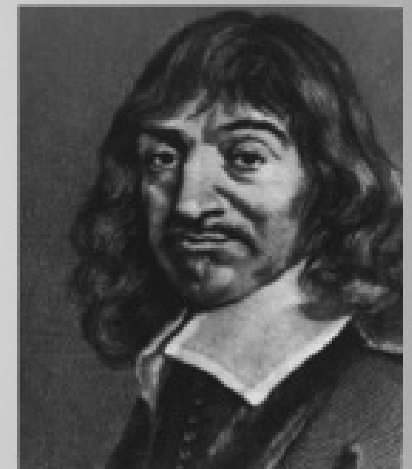
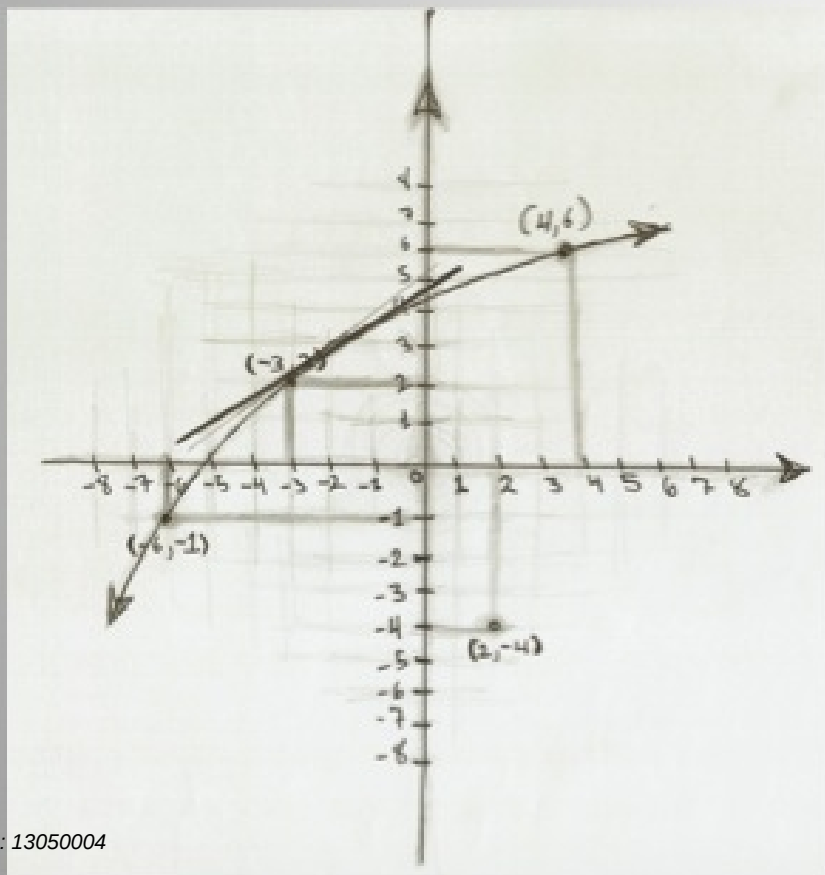
While Rome Fiddled, Arab World Flourished in Art, Math, Science

Ibn Al-Khwarizmi invents algebra



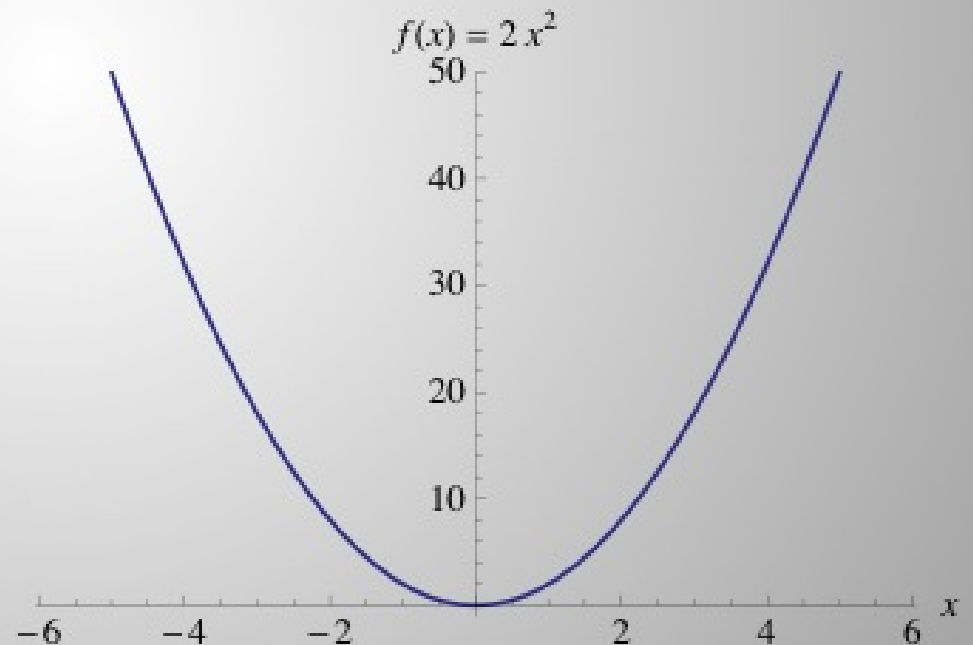
A Match Made in Heaven

Fermat and Descartes merge geometry, algebra

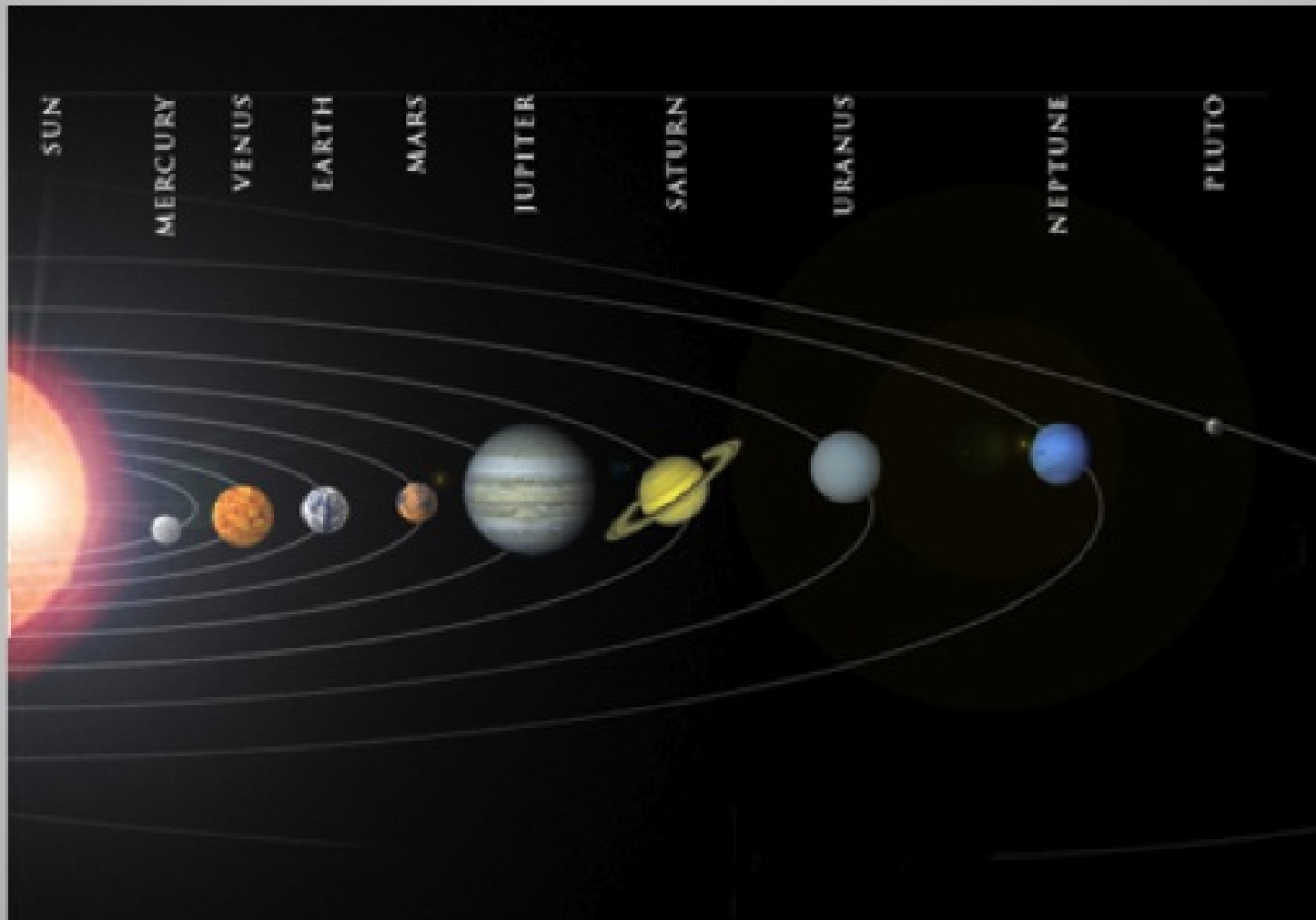


Of Curves and Calculus

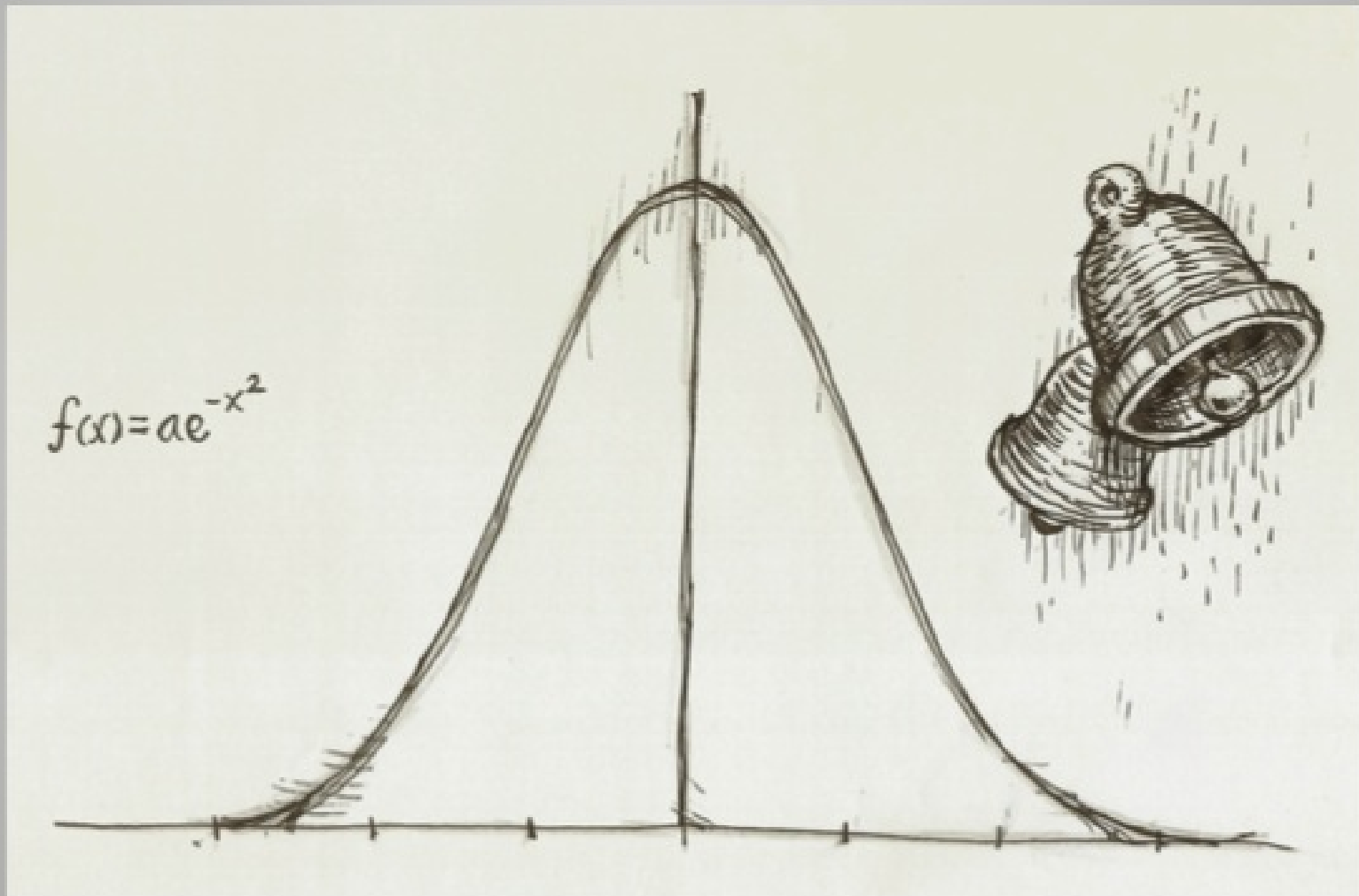
Curves are geometry in motion! EG: Apple falling from a tree = parabola!



Planets Have Elliptical Orbits



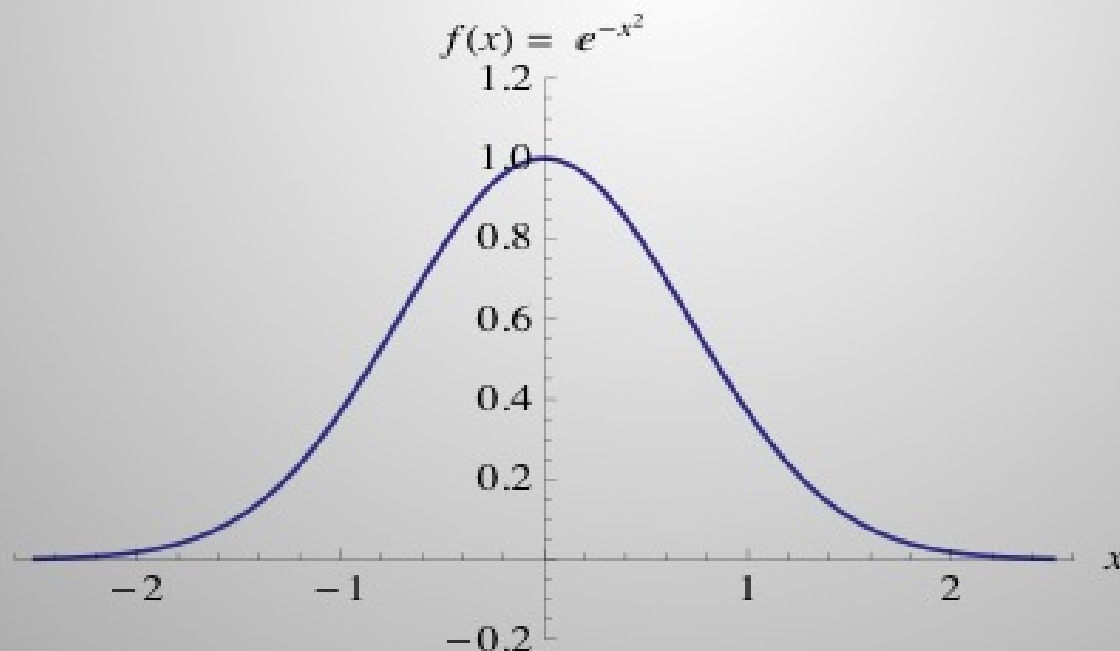
Curves = “Faces” of Functions



What is a function?

Every possible point on a curve taken together forms the function

Greater than sum of its parts: predictive model!



Math Can Model Our World



Tower of Terror = Parabola!

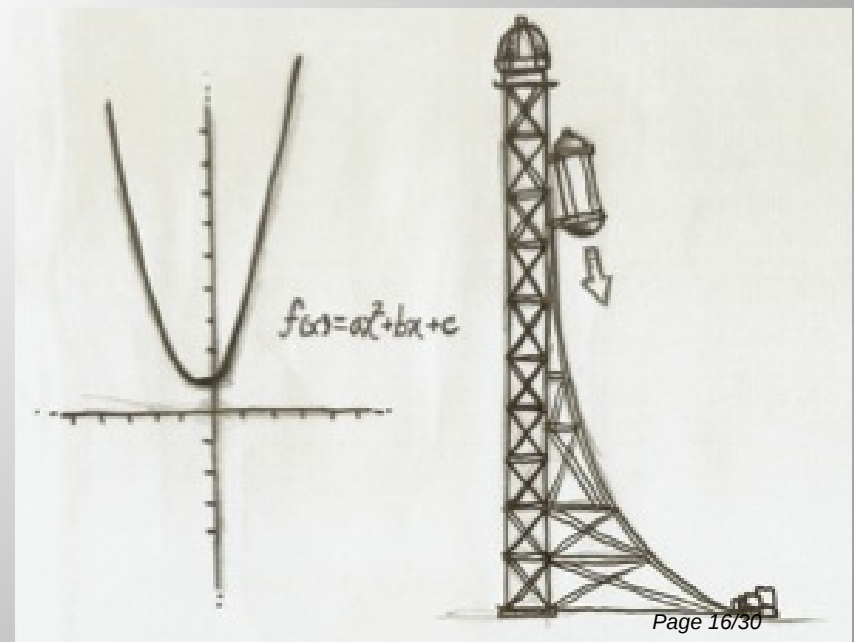
Plot change in position as a function of time = a parabola.

This is the “position function: $h(t) = -16t^2 + 200$

But what if we want to know how fast we’re moving at any given point? We need a “velocity function”! We can take a derivative to find it: $v = at$



=



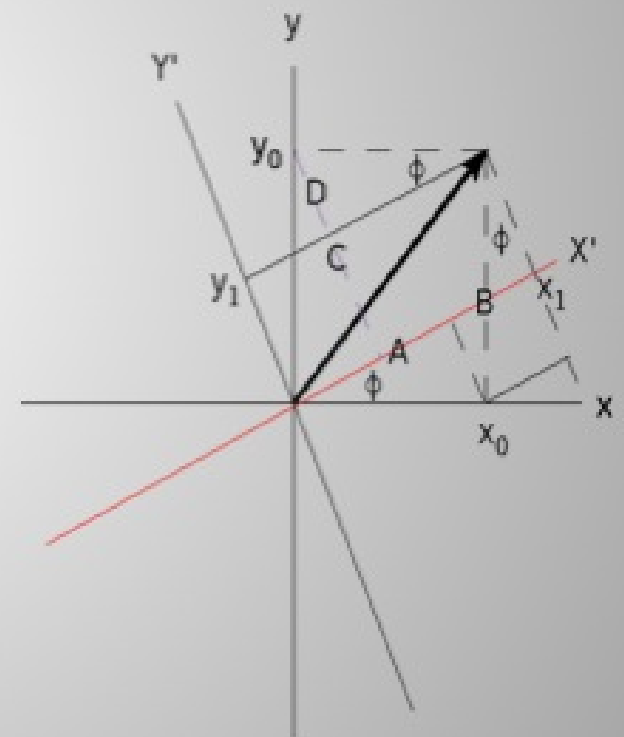
Fun with Space Mountain

Double integral of acceleration = position
BEHOLD THE POWER OF THE FUNCTION



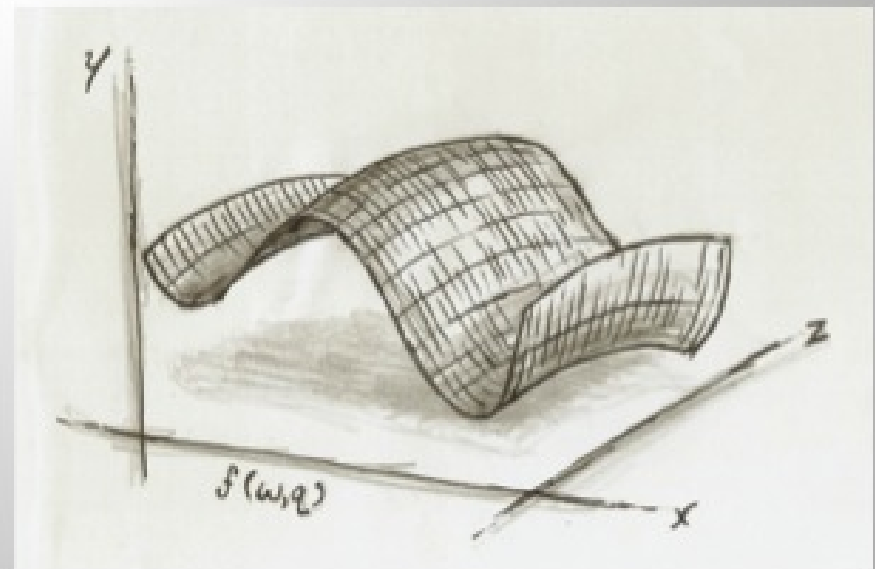
Calculus in the Real World

Vectors and Mad Teacup Ride at Disneyland



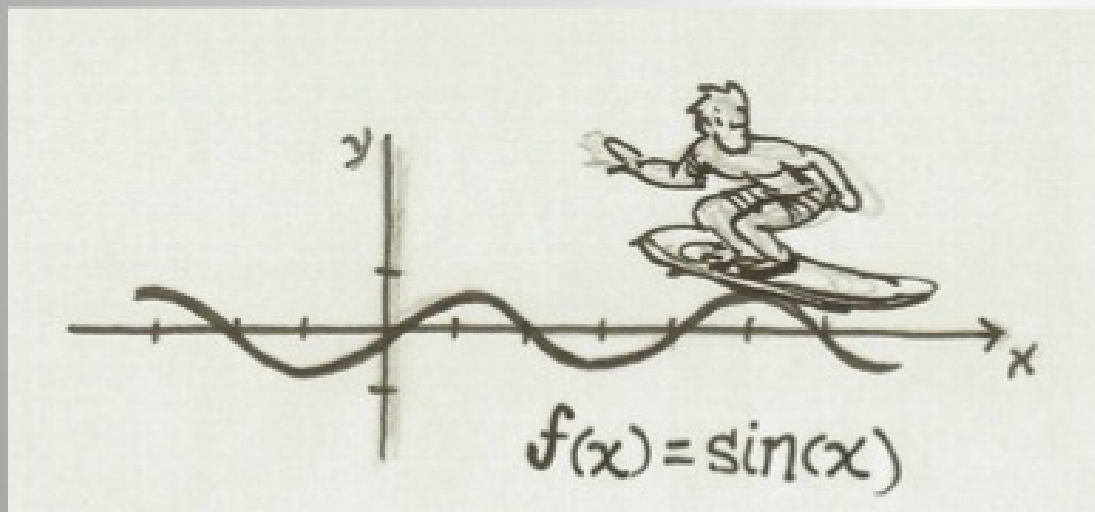
Calculus in the Real World

Comparison shopping = multivariable optimization problem (eg, house hunting)



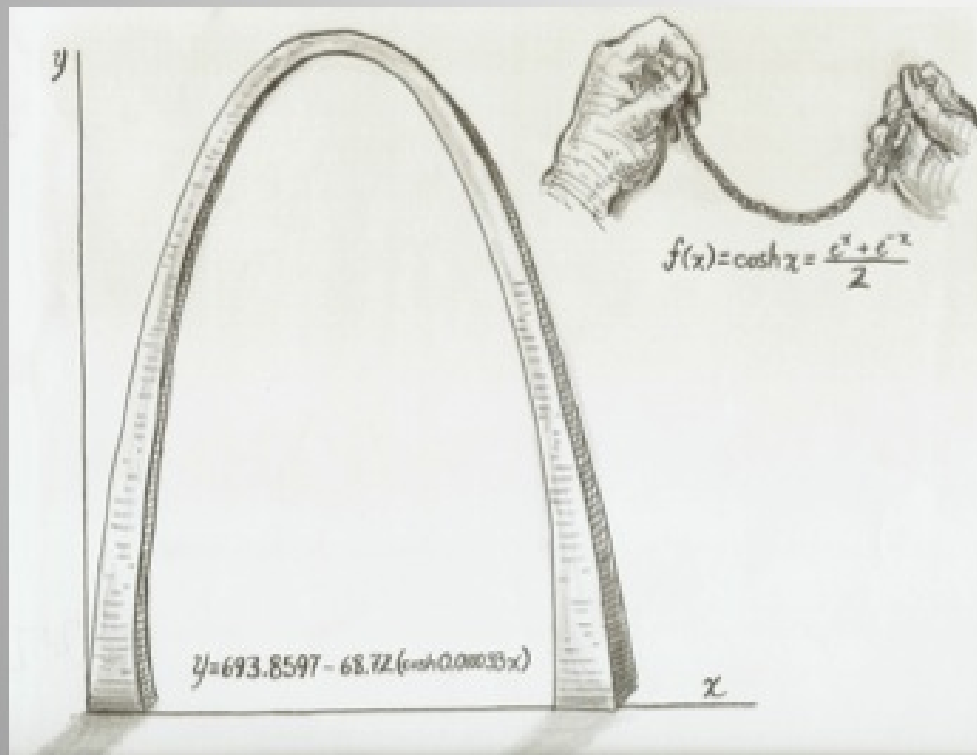
Calculus in the Real World

Wave dynamics = sine waves/Fourier transform



Calculus in the Real World

St. Louis Arch = catenary curve

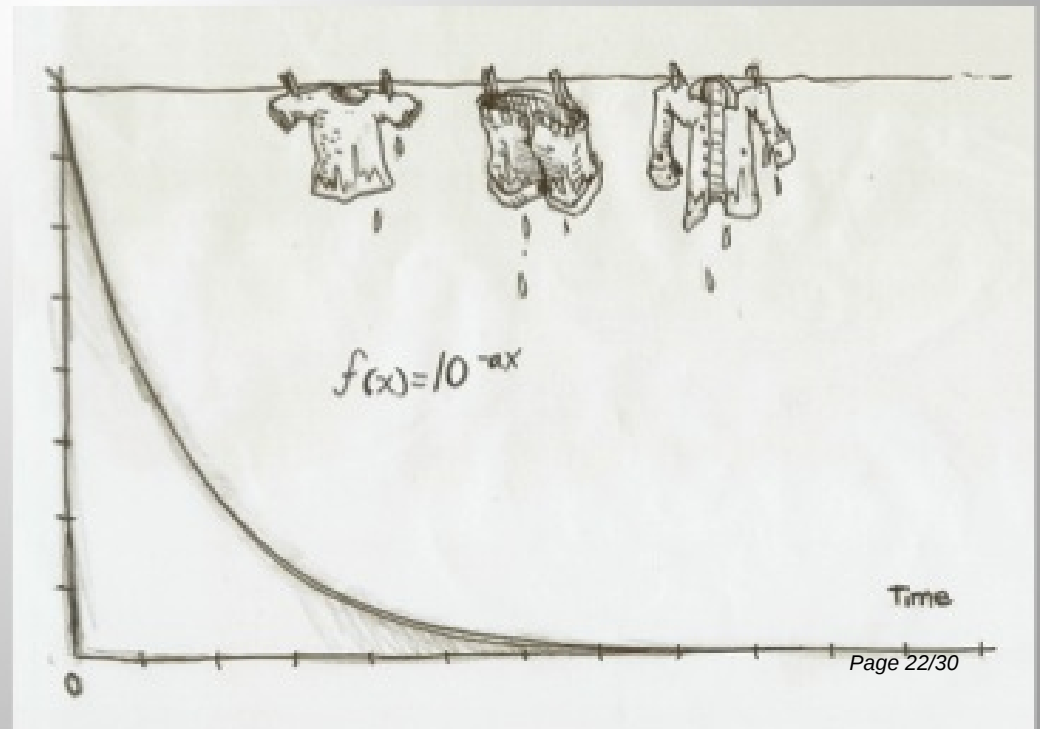


Calculus in the Real World

Cooling cup of coffee, rate at which wet clothing dries = exponential decay



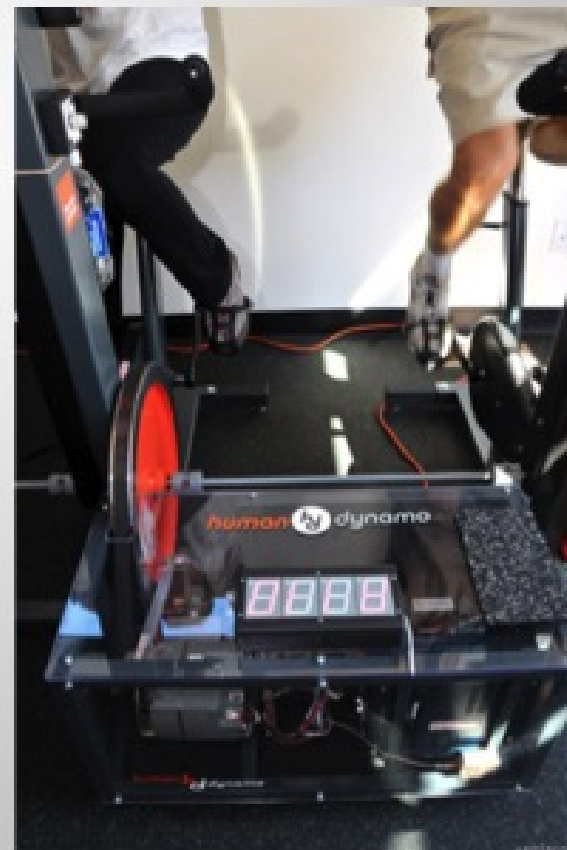
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Calculus in the Real World

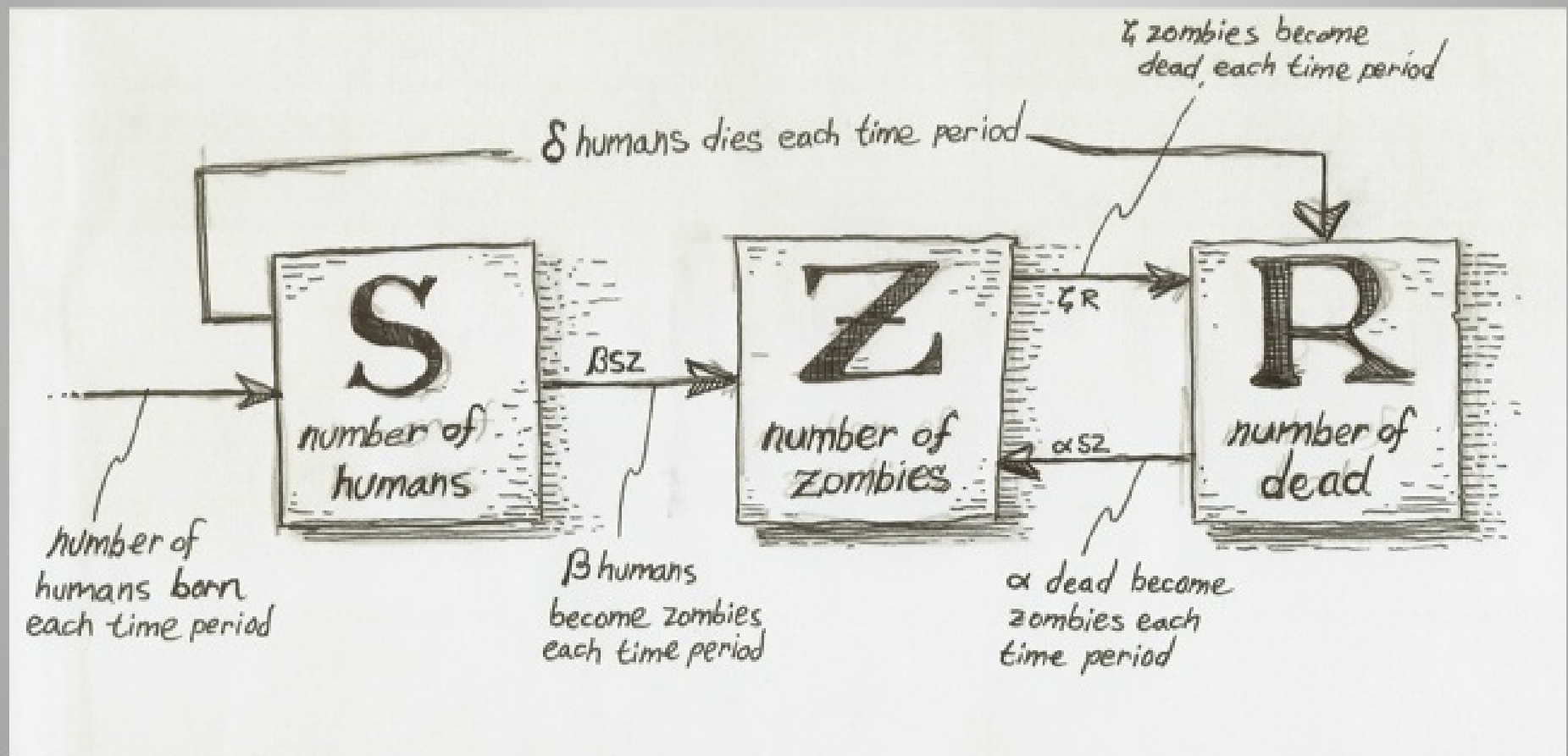
Exercise = integrating rate of calories burned to get total calories expended



Oh Yeah: About Those Zombies:



Doing the Math:



“Time To Nut Up or Shut Up!”



CAVEAT: People Don't Act Rationally

“Corrupted Blood” outbreak/World of Warcraft



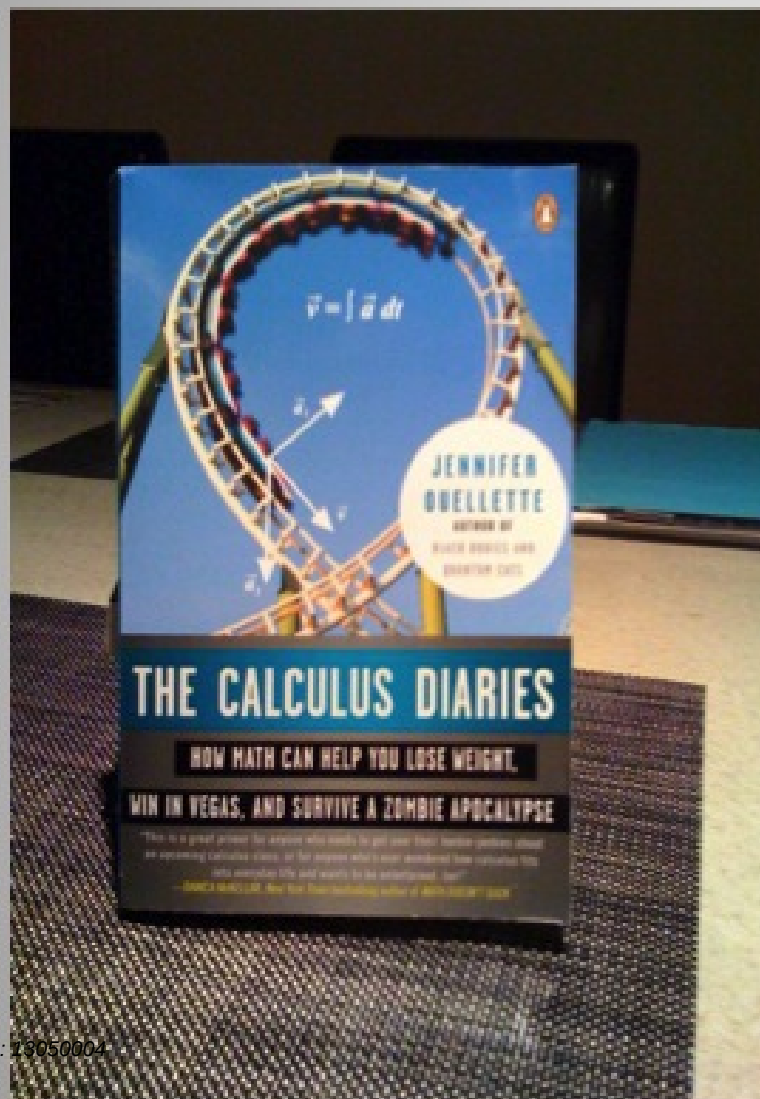
“Ancora Imparo”

**YOU MESS WITH
CALCULUS,
YOU MESS WITH
ME**

No, Really... Why Should I Care About Math?



Shameless Self-Promotion



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