Motivating Mathematics
Introduction – About Me

- Born in New Hampshire

- Attended high school at Saint Johnsbury Academy

- Studied Applied Mathematics at RIT

- Now pursuing a MS in Applied Statistics
Learning can be easy and fun, but mathematics requires motivation for when it isn’t.

An astronomer, a biologist and a mathematician are on a train in Scotland…
Employment

- Saint Johnsbury Town Energy Committee
  ◦ Calculate BTUs to heat housing stock
  ◦ Plot cost of installing photovoltaic cells

- CNC Lathe Operator
  ◦ Pythagorean Theorem
  ◦ Distance and position in three dimensions
- Unity Health Systems
  ◦ Statistical Quality Control
  ◦ Control Charts
    ◦ CLT
    ◦ Nelson Rules
    ◦ Spot the Problem

At least one estimated historical parameter is used in the calculations.
College Part I
‘When Will I Ever See this Again?’

- **Algebra**
  - Simplifying & solving equations
  - Multiplying & dividing polynomials
  - Graphs

- **Geometry**
  - Proofs!!!

- **Trigonometry**
  - Integrating & differentiating trig functions
  - Polar, cylindrical, & spherical coordinate systems
  - Free-body diagrams & periodic motion
  - Rotating & projecting vectors
College Part I cont.

- **Calculus**
  - Limits, sequences, & series
  - Integrating & differentiating
  - Transformations of functions

- **Graphing Calculators**
  - Double checking work

- **Standardized Tests**
  - Prepares students for testing
College Part II
Commandments of Studying Mathematics

Thou shalt show work lest thy grader pull eth their hair out.
Thou shalt sanity check your work lest thy foot be lodged in thy mouth.

Thou shalt use proper notation lest thy work be unreadable.
Thou shalt ask for help lest small problems grow large.
Humor is a great learning aid:

- **Chain Rule:** \( \frac{d}{dx} f(g(x)) = f'(g(x))g'(x) \)

\[
\frac{d}{dx} f(\text{small mongolian warhorse}(x)) = f'(\text{small mongolian warhorse}(x)) \frac{d \text{small mongolian warhorse}}{dx}
\]

- **Quotient Rule:**

\[
\frac{d}{dx} \frac{f(x)}{g(x)} = \frac{g(x)f'(x) - f(x)g'(x)}{g(x)^2}
\]

Lo-di-high minus high-di-lo over lo squared

- **FOIL:**

\[(a + b)^2 \neq a^2 + b^2!!!\]
"This is a one line proof...if we start sufficiently far to the left."
Fun Applications

Making Ice Cream

Aiming Catapults

Games
Conclusion

The math students use in high school will be seen again and again, in college and in the workplace.

A little humor, a little application, and a little support from teachers, and students will go a long way in mathematics.

VENI, VIDI, OPUS OSTENDI