Present

The Dangerous World of Pre-Calculus (Part 2)

I) Exponential Functions

- A. Evaluating Exponential Functions
  - 1. evaluation
  - 2. using the calculator
  - 3. a real-life exponential function
  - 4. easy exponent FACTS
    - a) zero exponent FACT
    - b) negative exponent FACT
    - c) fractional exponent FACT
  - 5. square root refreshaaaa
  - 6. common errors
- B. Rules of Exponents
  - 1. adding exponents rule
  - 2. power of a product rule
  - 3. multiplying exponents rule
  - 4. subtracting exponents rule
  - 5. power of a quotient rule
  - 6. recap of exponents FACTS
  - 7. changing the appearance of exponentials
  - 8. imposter rules
- C. Applications of Exponents
  - 1. compound interest
  - 2. nuclear radiation
- D. Graphs of Exponential Functions
- E. The Irrational Number e
  - 1. the goods on e
  - 2. standard form for base e exponential function
  - 3. continuously compounded interest

II. Logarithmic Functions

- A. Logs and Log Graphs
  - 1. inverse of exponentials
  - 2. logs on the calculator
  - 3. log graphs
- B. Logs-N-Exponents
  - 1. standard form
  - 2. changing a log to an exponent
- C. Log Base 10 and Log Base e
  - 1. common log
  - 2. natural log – base e
- D. Log Rules and Properties
  - 1. sweet easy rule: $\log_b b=1$
  - 2. sum of logs property
  - 3. difference of logs property
  - 4. log of exponents property
- E. Uses for Logs
  - 1. simplifying logs
  - 2. solving equations with logs
  - 3. extraneous roots
- F. Solving Exponential Equations with Logs
  - 1. easy ones (calculator)
  - 2. Gums
  - 3. warning – non-rules for Logs
- G. Converting Logs to Base 10 or Base e
  - 1. finding values for any log with base 10
  - 2. finding values for any log with base e
  - 3. converting any base to base e
- H. Putting Exponential Equations in Terms of e

I.

e:

e = 2.71828182...

base e exponential function standard form:

$A(t) = A_0 e^{kt}$

A_0 = starting amount

k = constant

t = time

continuously compounded interest:

$A(t) = Pe^{rt}$

r = annual percentage rate

t = time in years

P = principal

logarithmic function:

$f(x) = \log_b x$

$\log_b$ is inverse of b^x

$y = \log_2 8 \quad 2^y = 8$

2 is the base

y is the exponent, so y = 3

natural log:

ln or base e

common log:

log or base 10

sweet easy log rule:

$\log_b b = 1$

$\log_3 3 = 1$

$\ln e = 1$

$\log 10 = 1$

sum of logs property:

$\log_b mn = \log_b m + \log_b n$

$\log 30 = \log (10 \bullet 3) = \log 10 + \log 3$

difference of logs property:

$\log_b \frac{m}{n} = \log_b m - \log_b n$

$\log (.04) = \log \frac{4}{100} = \log 4 - \log 100$

log of exponents property:

$\log_b m^n = n(\log_b m)$

$\log (10^x) = x \log 10 = x$

II. FORMULAS

exponents:

$x^3 = x \bullet x \bullet x$

exponential function standard form:

$f(x) = b^x$

$b > 0$

Bacteria growing exponential formula:

$B(t) = 100(1.12^t)$

t = time

zero exponent FACT:

$b^0 = 1$

negative exponent FACT:

$b^{-x} = \frac{1}{b^x}$

fractional exponent FACT:

$b^{\frac{1}{n}} = \sqrt[n]{b} \qquad b^{m/n} = (\sqrt[n]{b})^m$

adding exponents rule:

$a^m \bullet a^n = a^{m+n}$

power of a product rule:

$(ab)^m = a^m \bullet b^m$

multiplying exponents rule:

$(a^m)^n = a^{m \bullet n}$

subtracting exponents rule:

$a^m / a^n = a^{m-n}$

power of a quotient rule:

$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$

compound interest formula:

$A(t) = P(1+r/n)^{nt}$

P = principal

n = # of interest payments per year

r = annual interest rate as decimal

t = # of years

half-life formula:

$A(t) = A_0 \left(\frac{1}{2}\right)^{t/h}$

A_0 = starting amount of substance

t = time

h = half-life

y-intercept for exponential functions:

$y = Ab^x$, A = y-intercept