- I will be able to write an equation with base e that models exponential growth or decay and use it to make predictions.

Sec. 11.3 The number e

Apr 1-6:53 PM

Exponential Growth or Decay
growing or decaying continuously

$N = N_0 e^{kt}$

N is the final amount
$\mathbf{N_0}$ is initial amount
k is a constant
t is the number of time periods

Apr 1-6:53 PM

Continuously Compounded Interest

$A = Pe^{rt}$

P is the principal
A is the final amount
r is the rate
t is the number of time periods

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30 $y = a^x$

$(-3)^x$

$x = \frac{1}{2}$

25 a. $y = .85^x$

c. $y = .85^{12}$

13) b. $P = 1 - e^{-mt}$

$.5 = 1 - e^{-34t}$

Y_2 Y_1 $.02$

Feb 24-7:41 AM

- I will be able to simplify and evaluate logarithmic expressions using of the properties of logarithms

Sec. 11.4 Logarithmic Functions

Exponential Form $y = a \cdot b^x$

Logarithmic Form

The logarithmic function $y = \log_a x$, where $a > 0$, $a \neq 1$ is the inverse of the exponential function $y = a^x$

Apr 1-6:59 PM

Definition of a Logarithm:

$b = a^x \Leftrightarrow x = \log_a b$

$\log_{10} x$ is often written as $\log x$

$\log_e x$ is often written as $\ln x$

$y = e^x$
$y = \ln x$
$2^3 = 8$
$\log_2 8 = 3$

No calculator problems
Evaluate the following:

$\log_{10} 1000$

3

$\log_8 16 = x$

$8^x = 16$
$2^{3x} = 2^4$
$3x = 4$
$x = 4/3$

$\log_2 \frac{1}{8} = x$

-3

$2^x = \frac{1}{8}$
$2^x = 2^{-3}$

$\log_{16} 2$

$1/4$

Feb 23-4:48 PM

Logarithm Practice (No Calculator)

a) Evaluate $\log_3 27$ 3

b) Evaluate $\log_5 5$ 1

c) Evaluate $\log_{12} 1 = x$ 0 $12^x = 1$

d) Evaluate $\log_3(1/3)$ −1

e) Evaluate $\log_4 2$ $x = 1/2$

f) Evaluate $\log_8\sqrt{8}$ $x = 1/2$

g) Solve $\log_2 x = 32$ $= x$ $X = 5$

h) Solve $\log_5 25 = 5x$ $5^{5x} = 25$ $5^{5x} = 5^2$ $x = \frac{2}{5}$

i) Solve $\log_x 36 = 2$ $X = 6$ $x^2 = 36$ $x = \sqrt{36}$

j) Solve $\log_{10}(9x+1) = 3$ $X = 111$ $10^3 = 9x + 1$ $1000 = 9x + 1$

Jan 11-7:56 AM

Properties of Logarithms

$\log_a xy = \log_a x + \log_a y$ $\qquad \log_2 32 = \log_2 8 + \log_2 4$

$\log_a \frac{x}{y} = \log_a x - \log_a y$ $\qquad \log 6 = \log 42 - \log 7$

$\log_a x^r = r\log_a x$ $\qquad \log_5 8 = \log_5(2^3) = 3\log_5 2$

$\log_a 1 = 0$ $\qquad a^0 = 1$

Sep 23-9:28 AM

$x = \log_2 a \qquad y = \log_2 b \qquad z = \log_2 c$

Write the following in terms of x, y, and z.

a) $\log_2 \frac{a^2 b}{c^3} = \log_2 a^2 + \log_2 b - \log_2 c^3$

$= 2\log_2 a + \log_2 b - 3\log_2 c$

$= 2x + y - 3z$

$\log_2 \frac{a}{b^2 c^3}$ $\qquad x - 2y - 3z$ $\qquad x - (2y + 3z)$

$\log_2 8ab$ $\qquad 3 + x + y$ $\qquad \log_2 8 + \log_2 a + \log_2 b$ $\qquad 3 + x + y$

Sep 23-9:32 AM

Logarithm Property Practice (No Calculator)

Express the following in terms of x, y and z given x=log a, y=log b, z=log c.

a) log(c/a)

b) $\log b^5$

c) $\log (a^2 b)$

d) $\log(a^2/(bc^3))$

e) $\log(5b)+\log(2c^2)$

Simplify:

f) ln x + ln (2y) - ln z

g) 3ln x - 5ln y

h) $\ln((5x^3)/(2y))$

i) $\ln(8x^4y^2z)$

Jan 11-8:07 AM

7. Solve the equation $\log_8 \sqrt{1-x} = \frac{1}{3}$.

$\log_3 8x = \log_3 16$

$8x = 16$

$x = 2$

$8^{1/3} = \sqrt{1-x}$

$2 = \sqrt{1-x}$

$4 = 1 - x$

$x = -3$

10. Solve the equation $3(1+\log x) = 6 + \log x$.

$\log \frac{x^3}{x} = 3$

$10^3 = x^2$

$3 + 3\log x = 6 + \log x$

$3\log x - \log x = 3$

$2\log x = 3$

$\log x = \frac{3}{2}$

$10^{3/2} = x$

$x = 31.62$

Feb 23-4:47 PM

Assignment: Sec. **11.3** p. 714 #12, 13, 18

Sec. **11.4** p. 723 #24, 26, 36-40, 43-47(odds), 49-51, 62

- I will be able to write an equation with base e that models exponential growth or decay and use it to make predictions.
- I will be able to simplify and evaluate logarithmic expressions using of the properties of logarithms

Apr 1-7:04 PM