Ditto 4.1

Test is Monday

1) $1.16 Million

2) a) $C(t) = 150(1.08)^t$
   b) $277.64

3) 9.1%

4) 20 days

5) a) 23 years
   b) 22 1/4 years

Nov 16-3:36 PM

2. A concert has been sold out for weeks, and as the date of the concert draws closer, the price of the ticket increases. The cost of a pair of tickets was $150 yesterday and is $162 today. Assuming that the cost continues to increase at this rate:
   a. Write an equation to model the cost of a pair of tickets.
   b. What will be the cost one week from now, the day before the concert?

a) $\text{rate} = \frac{162-150}{150} = \frac{12}{150} = .08$ (8% increase per day)

t = time = #days not years

$A = P(1+\frac{r}{n})^{nt}$

t = #days, n = #compounds per day = 1, $r = .08$

$A = 150(1+\frac{.08}{1})^{1(t)} \rightarrow A = 150(1.08)^t$

b) yesterday was 150, so $t=0$ (day 0) $\rightarrow A=150$.
Today is $t=1$ (day 1). 1 week from now is
$t = 1+7 = 8$
$A = 150(1.08)^8 = \$277.64$

Nov 29-3:22 PM

4. A super-deadly strain of bacteria is causing the zombie population to double every 2 days. Currently, there are 25 zombies. After how many days will there be 25,600 zombies?

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

Decay: base = 1/2, h = time for half the amount

Growth: base = double = 2, h = time to double = 2 days

$$\frac{25{,}600}{25} = \frac{25(2)^{t/2}}{25}$$

$$1024 = (2)^{t/2}$$

$$\log 1024 = \frac{t}{2}\log 2$$

$$2\log 1024 = t\log 2$$

$$t = \frac{2\log 1024}{\log 2} = 20 \text{ days}$$

Nov 29-3:23 PM

Exponential Equations

Nov 15-12:41 PM

Exponential Equations

PreCalc

Unit 4 Day 7

An exponential equation is an equation in which the variable is in the exponent.

When bases are not the same, follow these steps:

$2^2 = 4$
$2^3 = 8$
$2^4 = 16$
$2^5 = 32$
$2^6 = 64$

Steps:

Example: $2^{x-3} = 64$

1. Express each side of the equation in terms of the same base.
2. Set the exponents equal.
3. Solve.

$2^{x-3} = 2^6$

$x - 3 = 6$

$x = 9$

Nov 14-5:44 PM

Solve.

$5^2 = 25$

1. $4^{2x-3} = 4^{x+1}$

$2x - 3 = x + 1$

$-x + 3 \quad -x + 3$

$x = 4$

2. $5^{1-3x} = 25^x$

$5^{1-3x} = (5^2)^x$

$5^{1-3x} = 5^{2x}$

$1 - 3x = 2x$

$\frac{1}{5} = \frac{5x}{5}$

$x = \frac{1}{5}$

3. $9^x = 27^{x-1}$

$(3^2)^x = (3^3)^{x-1}$

$2x = 3x - 3$

$3 = x$

$x = 3$

4. $81^{3x+3} = 9$

$(3^4)^{3x+3} = 3^2$

$(9^2)^{3x+3} = 9^1$

$6x + 6 = 1$

$6x = -5$

$x = -\frac{5}{6}$

Nov 14-5:45 PM

5. $125^{-2x} = 25^{x+1}$

$(5^3)^{-2x} = (5^2)^{x+1}$

$-6x = 2x + 2$

$-2 = 8x$

$x = -2/8 = -\frac{1}{4}$

6. $\left(\frac{1}{16}\right)^{x} = 64^{1-x}$

$4^2 = 16$

$4^3 = 64$

$\left(\frac{1}{4^2}\right)^{x} = (4^3)^{1-x}$

$(4^{-2})^{x} = 4^{3-3x}$

$-2x = 3 - 3x$

$x = 3$

Nov 14-5:46 PM

If you can't get a common base...

Steps:

1. Isolate the exponential term ✓
2. Take the log of both sides. (ln if e)
3. Use the power rule.
4. Isolate the variable.
5. Use calculator!

$9^x = 43$

$\log 9^x = \log 43$

$x \log 9 = \log 43$

$x = \frac{\log 43}{\log 9}$

$x = 1.712$

16^{2x}

$2x \log 9 = \log 43$

$x = \frac{\log 43}{2 \log 9}$

Nov 14-5:46 PM

Solve. Round all answers to the nearest thousandth. (3 dec)

1. $5^{2x} = 15$

$2x\log 5 = \log 15$

$x = \frac{\log 15}{2\log 5}$

$x = .841$

2. $\frac{8 \cdot 13^x}{8} = \frac{61}{8}$ Isolate

$13^x = 7.625$

$x\log 13 = \log 7.625$

$x = \frac{\log 7.625}{\log 13} \approx .792$

3. $6 = e^t$ use ln

$\ln 6 = t \ln e$

$t = 1.792$

4. $\frac{14}{2} = \frac{2e^{3t}}{2}$ Isolate

$7 = e^{3t}$

$\ln 7 = 3t \ln e$

$t = \frac{\ln 7}{3} \approx .649$

Nov 14-5:46 PM

5. $6^{x+1} = 7^{2-x}$

$(x+1)\log 6 = (2-x)\log 7$

$x\log 6 + \log 6 = 2\log 7 - x\log 7$

$x\log 6 + x\log 7 = 2\log 7 - \log 6$

$x(\log 6 + \log 7) = 2\log 7 - \log 6$

$x = \frac{(2\log 7 - \log 6)}{(\log 6 + \log 7)}$

$x \approx .562$

6. $-4e^{2x-3} + 1 = -59$

$-1 \quad -1$

$\frac{-4e^{2x-3}}{-4} = \frac{-60}{-4}$

$e^{2x-3} = 15$

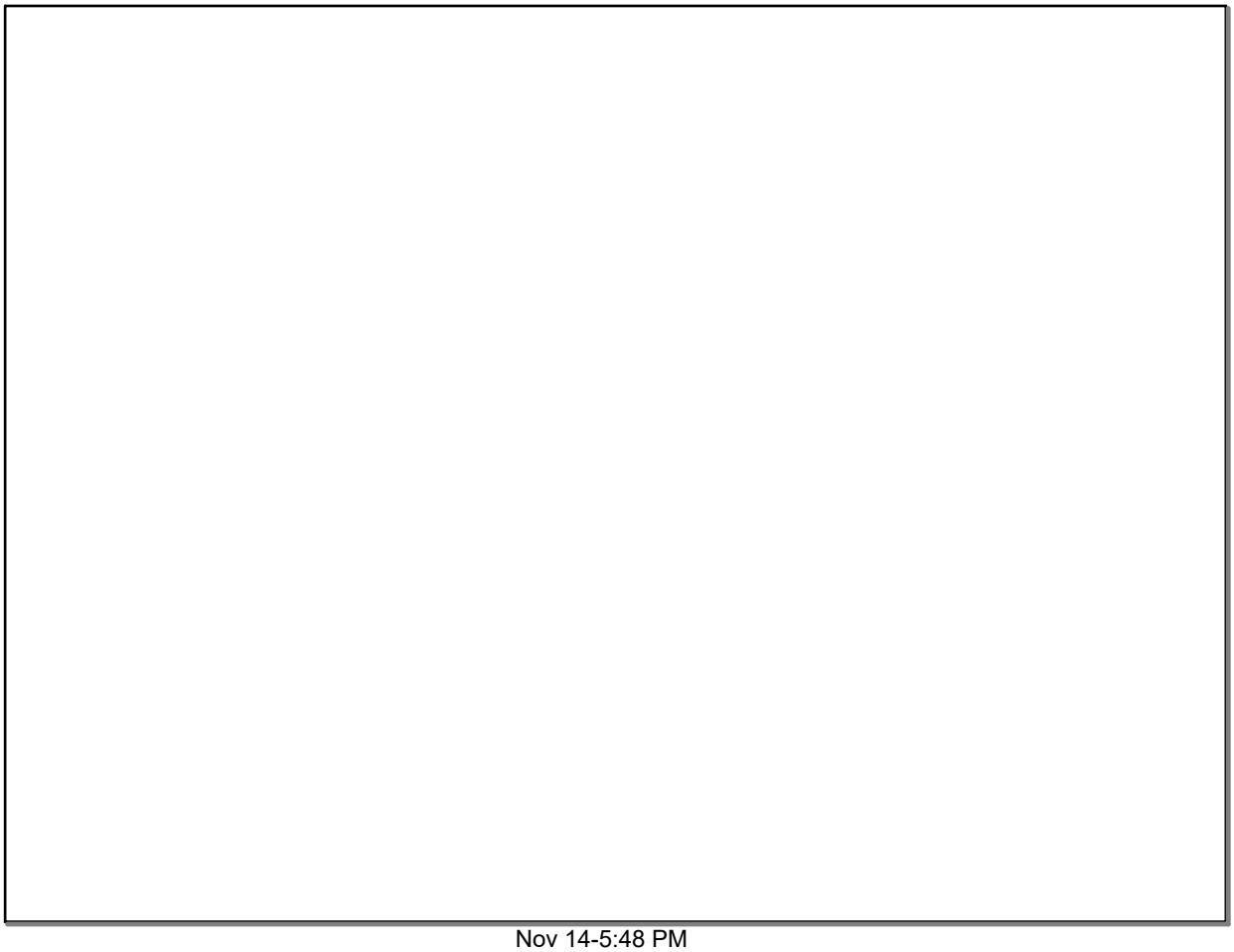
$(2x-3)\ln e = \ln 15$

$\frac{2x}{2} = \frac{\ln 15 + 3}{2}$

$x = \frac{\ln 15 + 3}{2}$

$x \approx 2.854$

Nov 14-5:47 PM



Nov 14-5:48 PM