

Warm up:

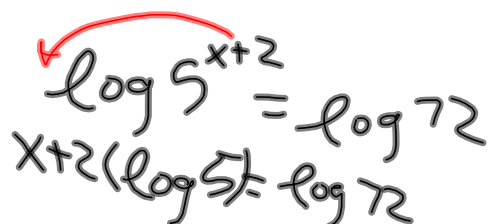
Come up with any questions you may have from sections 7-5 thru 7-8

7-5: Solving for variable in exponent

Two ways to do this.

1) Take the log of both sides

Ex:  $5^{x+2} = 72$


$$\log 5^{x+2} = \log 72$$
$$(x+2)(\log 5) = \log 72$$

$$x = \frac{\log 72}{\log 5} - 2$$

2) Get the same base and then set the exponents equal to each other...

Ex:  $27^{x+2} = 3^6$

$$(3^3)^{x+2} = 3^6$$

$$3^{3x+6} = 3^6$$

$$3x+6=6$$

$$3x=0$$

$$x=0$$

You can compare by graphing as well. Put each in y1 or y2 on calculator and then find intersection points.

## 7-6: Natural Logarithms

The natural log is e. It is approximately 2.71 and shows up in lots of exponential places. It follows the same rules as logs just written as ln.

ln cancels out with e so if you see both in a problem just cancel them:

Ex:  $\cancel{\ln} e^{7x} \quad e^{\cancel{\ln} 14}$

$$7x$$

$$14$$

The first formula we had was  $A = Pe^{rt}$  which helps find interest compounded continuously. Just plug in numbers and simplify.

Ex: What is the amount made on an investment if \$2000 was invested over 7 years with an interest rate of 5.4%?

$$2000e^{.054 \cdot 7}$$

$$2918.73$$

(e) ~~X~~

The second formula was about half life. It looks like  $F = ie^{-kt}$ . To solve these problems first find the decay constant with the equation  $.5 = 1e^{-kt}$  and then use the half life formula to solve.

Ex: How long would it take an element to decay to 3g from 17g if the half life is 3 years?

$$.5 = 1e^{-k \cdot 3}$$

$$k = \frac{\ln .5}{-3}$$

$$k = .231$$

$$\frac{3}{17} = \frac{17}{17} e^{-.231t}$$

$$\frac{3}{17} = e^{-.231t}$$

$$\frac{\ln \frac{3}{17}}{-.231} = \frac{-.231t}{-.231}$$

$$t = \frac{\ln \frac{3}{17}}{-.231}$$

$$t = 7.51 \text{ yrs.}$$

Half life  $\rightarrow$  5 yrs  
20g to 7g

$$S = 1e^{-k \cdot t}$$

$$\frac{\ln S}{-S} = \frac{-5k}{-5} \text{ ~~and~~ }$$

$$k = .139$$

~~input~~

$$A = 1e^{kt}$$

$$\frac{7}{20} = \frac{20e^{-.139t}}{20}$$

$$\frac{\ln \frac{7}{20}}{-.139} = \frac{-1.39t}{-.139}$$

$$t = \frac{\ln \frac{7}{20}}{-.139}$$

$$t = 7.5 \text{ yrs}$$

### 7-7: Transforming Graphs

Same thing as translating other functions.

If add/subtract from x in parentheses move left or right (remember it is opposite)

ie: (x-2) is right 2 and (x+3) is left 3

If add/subtract at the end move up or down

If a -x then reflection over y axis

If a - in front of whole function then reflection over x axis

If  $x$  is multiplied by a number then horizontal stretch or compression.

If function is multiplied by a number then vertical stretch or compression.

### 7-8: Regressions

To find an exponential regression:

- Plug your points into 2 set lists
- Choose for your calculator to find an exp reg

To predict a value:

- 1) Put your regression equation into the y1 column
- 2) Put the number they want predicted in the y2 column
- 3) Graph them both and find the intersection. The x-value will be your prediction.

$$\begin{array}{r|rrrr} x & 1 & 2 & 3 & 4 \\ \hline y & 4 & 8 & 16 & 32 \end{array} \quad \frac{16}{8} = 2$$

Any questions or problems you want to try before taking the quiz?  
Now is your chance!

If you finish you can start your test review.  
**THIS IS NOT DUE MONDAY!** You will  
have time to work Monday as well. But in  
case you want to get some done

p.521 #1-30

p.553 #1-25