Before we begin, are there any questions from last day's work?

p.377 #2
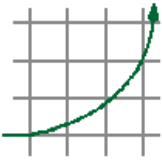
+ 3 worksheet questions

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) sketch an exponential relation (growth or decay)
b) state similarities and differences between growth and decay graphs
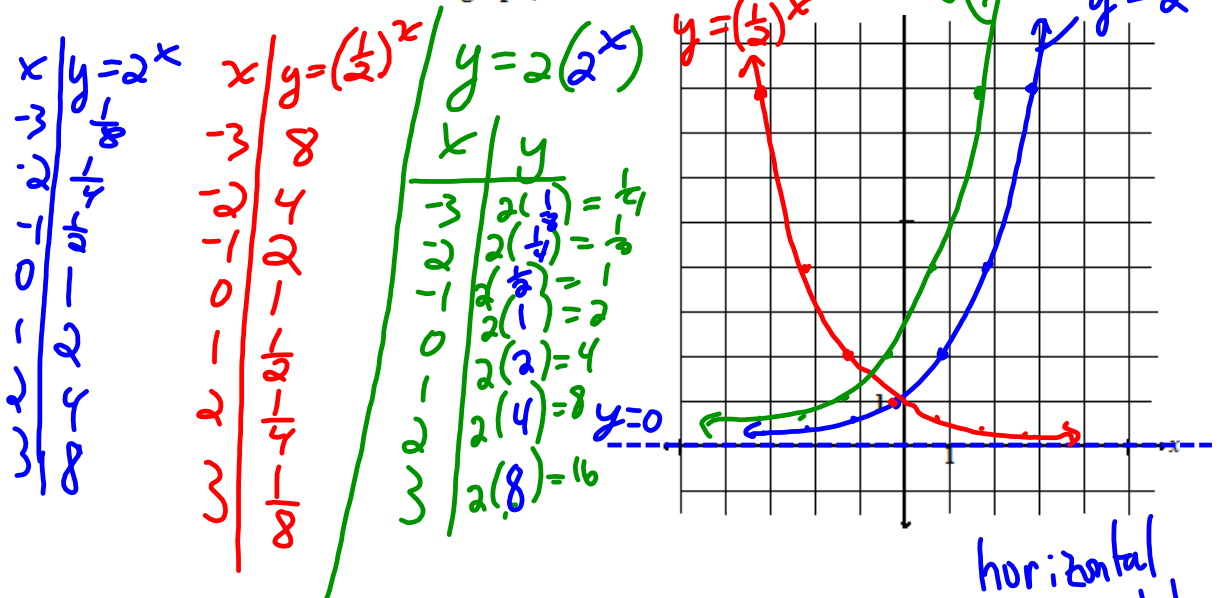c) recognize an exponential relation by its equation
    (ie. not needing a graph)

MBF 3CI

Date: May 16/17

Graphing Exponential Relations (7.4)

1. a) On the same set of axes, graph $y = 2^x$ and $y = \left(\frac{1}{2}\right)^x$.

Use a table of values for each graph, with x from -3 to 3.

x	$y=2^x$
-3	$\frac{1}{8}$
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8

x	$y=\left(\frac{1}{2}\right)^x$
-3	8
-2	4
-1	2
0	1
1	$\frac{1}{2}$
2	$\frac{1}{4}$
3	$\frac{1}{8}$

$y = 2(2^x)$

x	y
-3	$2\left(\frac{1}{8}\right) = \frac{1}{4}$
-2	$2\left(\frac{1}{4}\right) = \frac{1}{2}$
-1	$2\left(\frac{1}{2}\right) = 1$
0	$2(1) = 2$
1	$2(2) = 4$
2	$2(4) = 8$
3	$2(8) = 16$

$y = \left(\frac{1}{2}\right)^x$ $y = 2(2^x)$ $y = 2^x$

$y = 0$

horizontal asymptote

b) Describe how the graphs are similar.

☞ both are exponential relations
☞ both have a y-intercept of 1
☞ both never cross the *x*-axis, ∴ no *x*-intercept **(same asymptote: $y = 0$)**

c) How are the graphs different?

☞ y=2ˣ is an example of exponential GROWTH (it is increasing).
☞ $y = \left(\frac{1}{2}\right)^x$ is an example of exponential *decay* (it is decreasing).

d) For both graphs, what is the *y*-intercept? What is the *x*-intercept?

☞ both graphs have a y-intercept of 1
☞ both graphs do not have an *x*-intercept
(there is a horizontal *asymptote*, that the curve will never cross).

e) Now graph $y = 2\left(2^x\right)$ on the grid.

An **exponential relation** is of the form $y = a(b^x)$, where a and b are numbers, $b \neq 1$ and x and y are variables. For example, $y = 2(3.1^x)$ is an exponential relation.

2. Which of the following are exponential relations? Explain.

 a) $y = 4(3^x)$

☞ Exponential.
   The variable is in the exponent.

 b) $y = x^3$

☞ **NOT** Exponential.
   The exponent is 3, not a variable.

 c) $V = 2.1^t$

☞ Exponential.
   The variable is in the exponent.

$$V = 1(2.1)^t$$

 d) $y = 4 \times (1.01)^x$

☞ Exponential.
   The variable is in the exponent.

For an exponential relation $y = a(b^x)$,

☞ if b>1, then exponential growth

☞ if 0<b<1, then exponential decay

Also for $y = a(b^x)$
- The y-intercept is always a.
- There is no x-intercept.

Entertainment: **YOU NEED GRAPH PAPER FOR #4.**

1. READ p.385 Ex.2, pp.386-387 Ex.3
2. READ p.389 "Key Concepts"
3. p. 390 #1 and 2
4. p. 391 #4 (**in your table of values** choose x from -3 to 3. Also, look in the text's answer section
        to check your graphs **instead of a graphing calculator**.)
5. p. 391 #6
6. Are you done last class' homework on the worksheet? If not, do it now.