Now for the last section in Chapter 5

Sec 5-6: Inverse Relations and Functions

We already did this last semester!

Chapter 6: Exponential and Logarithmic Functions

There are two types of exponential functions:

1. Growth
2. Decay

Exponential Functions:

$$y = a\,(b)^x$$

Values for each variable:

$a \neq 0$ $\quad b > 0$ but $b \neq 1$

x = any real number

$$y = a\,(b)^x$$

- a: coefficient
- b: Base: Growth or Decay Factor
  - $b > 1$
  - $0 < b < 1$
- x: Exponent

Graphs of exponential functions:

Exponential Growth:

Equation

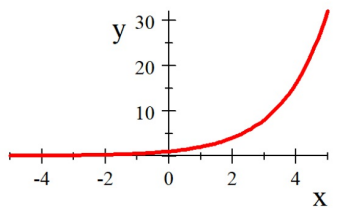
$y = 2^x$

Exponential Growth because b>1

Table

X	Y
−2	0.25
−1	0.5
0	1
1	2
2	4

Graph



Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

Asymptote: $y = 0$

y -int: $y = 1$

Exponential Decay:

Equation

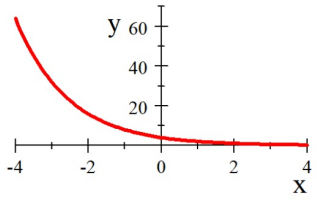
$y = (0.5)^x$

Exponential Decay because 0<b<1

Table

X	Y
−2	4
−1	2
0	1
1	0.5
2	0.25

Graph



Domain: $(-\infty, \infty)$

Range: $(0, \infty)$

Asymptote: $y = 0$

y -int: $y = 1$

When b>1 the graph represents Exponential Growth.

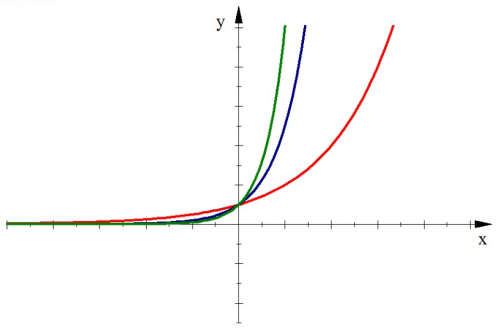
b is called the Growth Factor

Which graph is which equation?

$y=2^x$

$y=5^x$

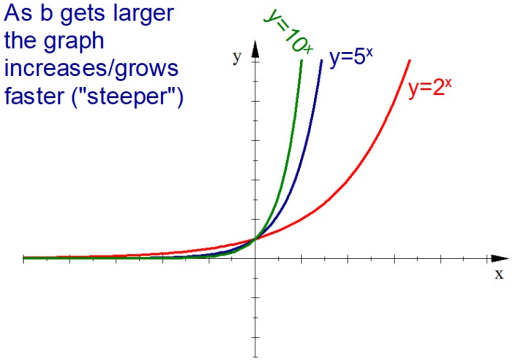
$y=10^x$



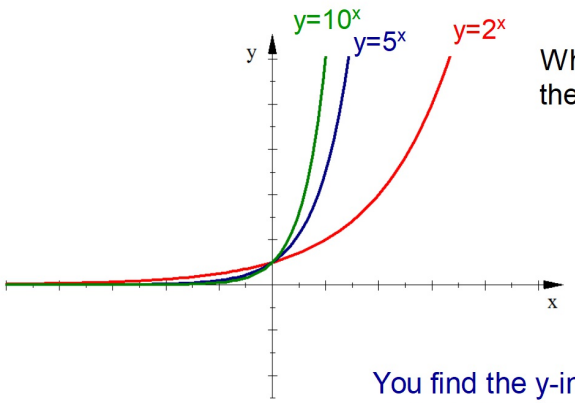
When b>1 the graph represents Exponential Growth.

b is called the Growth Factor

As b gets larger the graph increases/grows faster ("steeper")

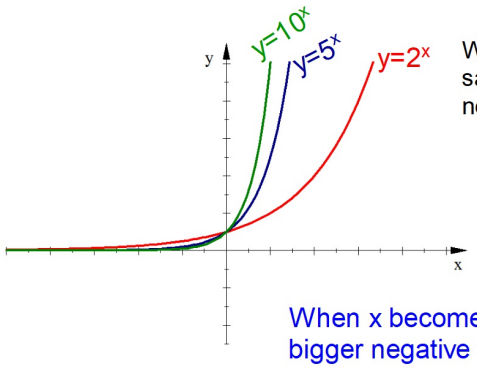


10 is the biggest base so it is the steepest graph.
2 is the smallest base so it will be the least steep (flattest).



Why do they all have the same y-intercept?

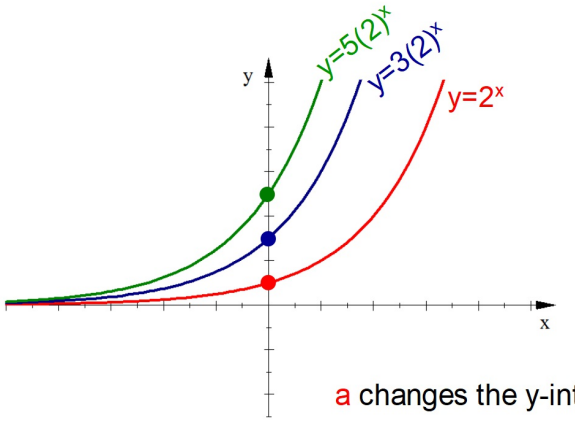
You find the y-int by replacing x with zero and when you do this all three equations equal 1.



Why do all these graphs have the same asymptote and why will they never reach or cross the x-axis?

When x becomes bigger and bigger negative the reciprocal of the base becomes a smaller and smaller number but will never become negative nor will it ever reach zero.

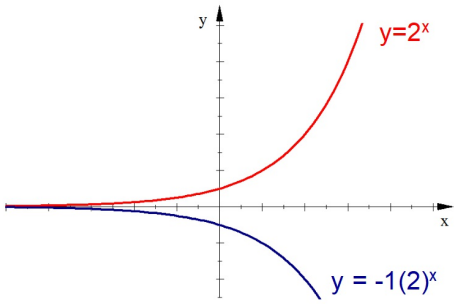
What does changing the value of a do to the graph of $y=a(b)^x$?



a changes the y-intercept.

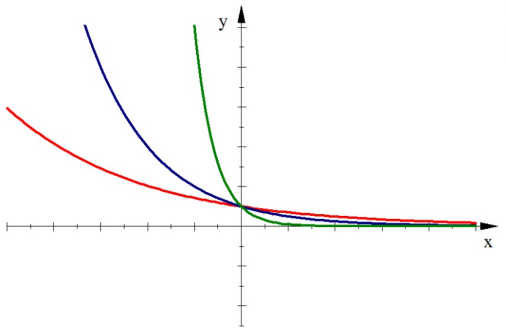
In fact, a IS the y-intercept

What does a negative value of a do to the graph of $y = a(b)^x$



x-axis reflection
Upside Down

Exponential Decay



Which graph
is which equation?

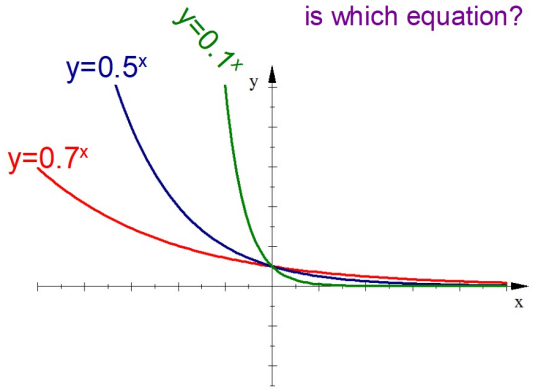
$y=0.1^x$
$y=0.5^x$
$y=0.7^x$

Exponential Decay

As b gets smaller, but still positive, the graph decreases faster ("steeper")

0.1 is the smallest base so it will be the steepest.
0.7 is the biggest of the bases so it will be the least steep (flattest)

Which graph
is which equation?



Graphs of $y = a \cdot b^x$

a: the y-intercept. If a is negative graph is upside down (x-axis reflection)

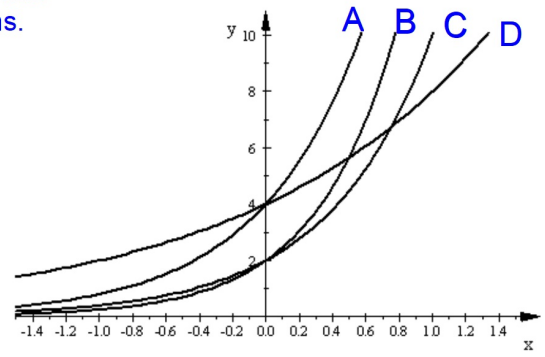
b: Growth or Decay Factor

Growth Factor: The larger the value of b the faster the graph increases.
$b>1$

Decay Factor: The smaller the value of b the faster the graph decreases
$0<b<1$

Match up the equations with their graphs.

1.___ $y = 4(2)^x$ 2.___ $y = 2(5)^x$ 3. ___ $y = 2(8)^x$

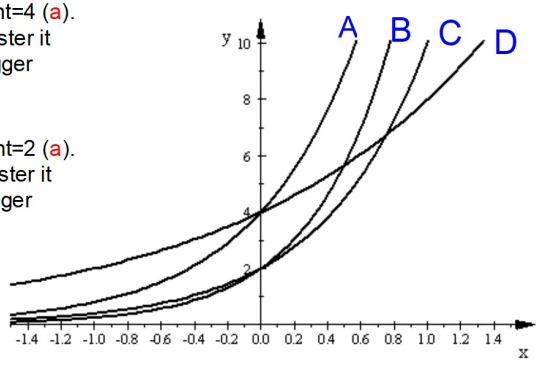


4.___ $y = 4(5)^x$

1. D $y = 4(2)^x$ 2. C $y = 2(5)^x$ 3. B $y = 2(8)^x$

A and D have y-int=4 (a). Since A grows faster it must have the bigger base (5)

B and C have y-int=2 (a). Since B grows faster it must have the bigger base (8)



4. A $y = 4(5)^x$