8.5 Exponential Growth Functions

Exponential

$y = ab^x$

* is not a line, but a curve.

Goes up or down by a larger or smaller rate. Not constant.

Linear

$y = mx + b$ or $Ax + By = C$

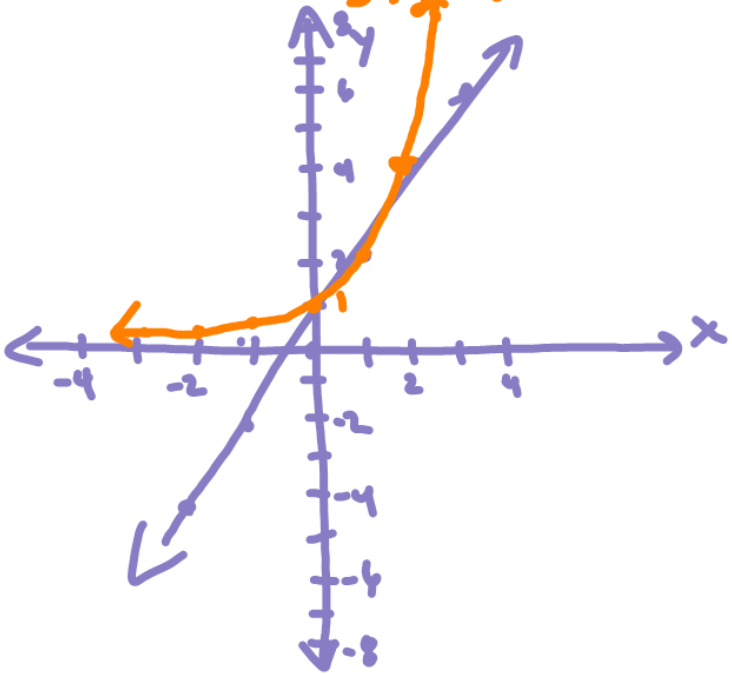
* Is a line. goes up/down at the same rate (slope)

$y = 2x$

x	y
-2	-4
-1	-2
0	0
1	2
2	4
3	6

$y = 2^x$

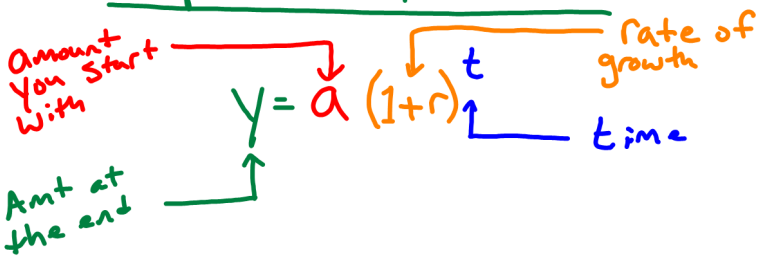
x	y
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8



$y = -2^x$

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

Exponential Growth Model



Example

Your mom bought a '68 convertible Mustang in 1991 for $11,000. It increased in value by 6% per year.

(a) Write a function for the situation.

$$y = 11000(1+.06)^t$$

(b) If you sell it in 2012, how much is it worth?

time = 21 yrs

$y = 11000(1.06)^{21}$

$11000(1.06)\boxed{\wedge}21$

$= 37,395$

Exponential Decay (smaller)

$$y = a(1 - r)^t$$

Change to subtract.

$y = 3^x$

x	y
-2	$3^{-2} = \frac{1}{9}$
-1	$3^{-1} = \frac{1}{3}$
0	$3^0 = 1$
1	$3^1 = 3$
2	$3^2 = 9$
3	$3^3 = 27$

$y = 2 \cdot 3^x$

x	y	
-2	$\frac{2}{9}$	$\frac{1}{9} \cdot 2$
-1	$\frac{2}{3}$	$\frac{1}{3} \cdot 2$
0	2	
1	6	
2	18	
3	54