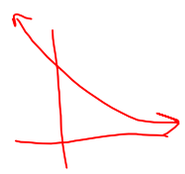
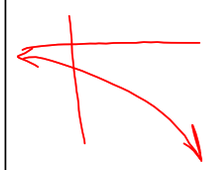
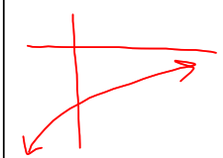
3.4 Properties of Exponential Functions

$$f(x)=ab^x$$

Investigate with Desmos and note how the exponential function changes as the base "b" and initial value "a" changes.

Look fors:

- ☆ The location of the x and y intercepts?
- ☆ The location of the horizontal asymptote?
- ☆ The Domain and Range

	a>0, b>1 $a=3$ $b=2$	a>0, 0<b<1 $a=3$ $b=\frac{1}{2}$	a<0, b>1 $a=-3$ $b=2$	a<0, 0<b<1 $a=-3$ $b=\frac{1}{2}$
Transformations	Base $y=2^x$ V.S of 3	V.S. by a	Vert. Refl. V.S. by a	V. Refl. V.S. by a
Domain	$\{x \in \mathbb{R}\}$	$\{x \in \mathbb{R}\}$	$\{x \in \mathbb{R}\}$	$\{x \in \mathbb{R}\}$
Range	$\{y \in \mathbb{R} \mid y>0\}$	$\{y \in \mathbb{R} \mid y>0\}$	$\{y \in \mathbb{R} \mid y<0\}$	$\{y \in \mathbb{R} \mid y<0\}$
x-int	none	none	none	none
y-int --> f(0)	a	a	a	a
Horizontal Asymptote	$y=0$	$y=0$	$y=0$	$y=0$
Growth or Decay	GROWTH	DECAY		
Sketch				

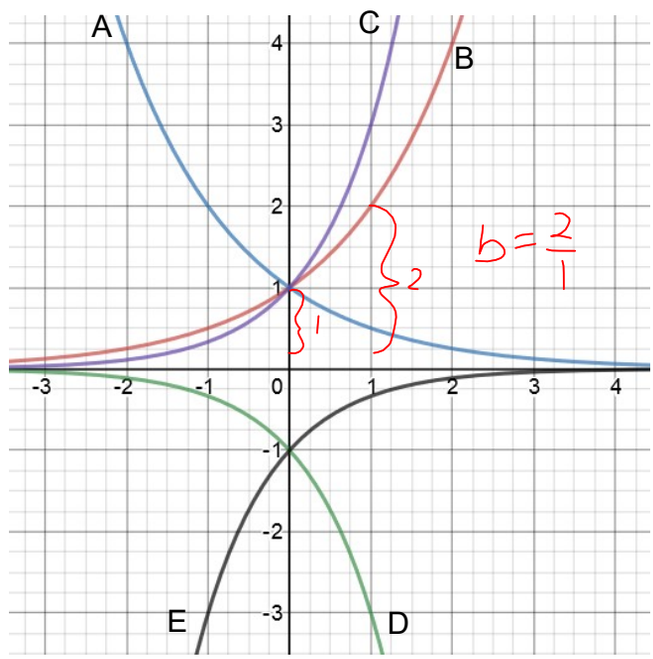
Ex.2 Match the graph with the equation. There are extra equations.

$y=2^x$ B $y=3^x$ C

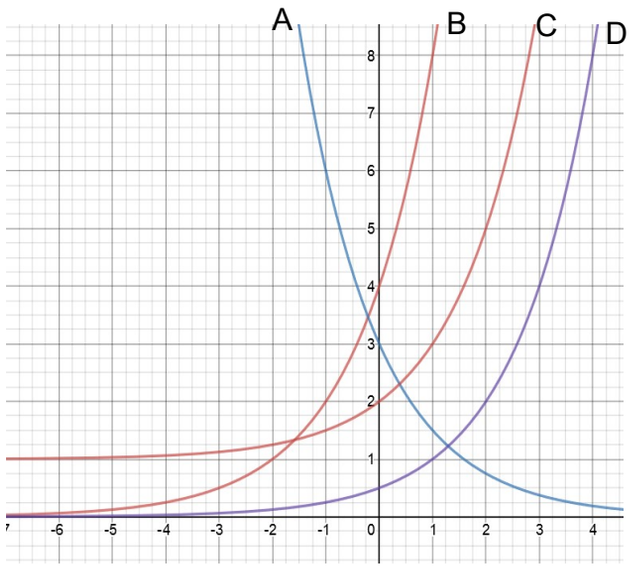
$y=-3^x$ D $y=-2^x$ ___

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

$y=\left(\frac{1}{3}\right)^x$ ___ $y=-\left(\frac{1}{3}\right)^x$ E



Ex. 3



Match the graph with the equation.
There are extra equations.

$y = 4(2)^x$ B $y = 2^x + 1$ C

$y = \frac{1}{2}(2)^x$ D $y = 3\left(\frac{1}{2}\right)^x$ A

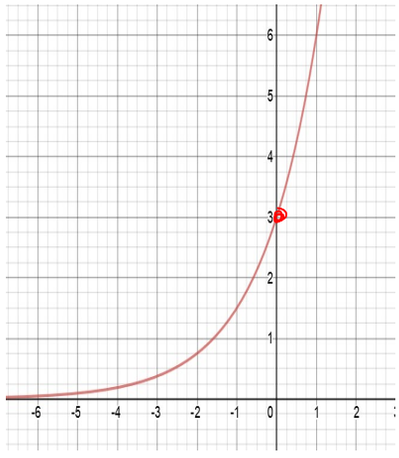
Same eqn

$y = 2^{x-1}$ D $y = (-6)^x$ ___

$y = 4\left(\frac{1}{2}\right)^x$ ___

$\therefore 2^{-1}2^x = \frac{1}{2}2^x = 2^{x-1}$

Ex.4 Write an equation to represent the following graph



$a = 3$ y-int

$b = 2$

$\therefore y = 3 \cdot 2^x$

Homework
Pg. 185 # 1,3,4,5,7ac,10