MCR3U
Ms. Kueh

Determining the Equation

* Unit Test on Thurs (Ap 23)

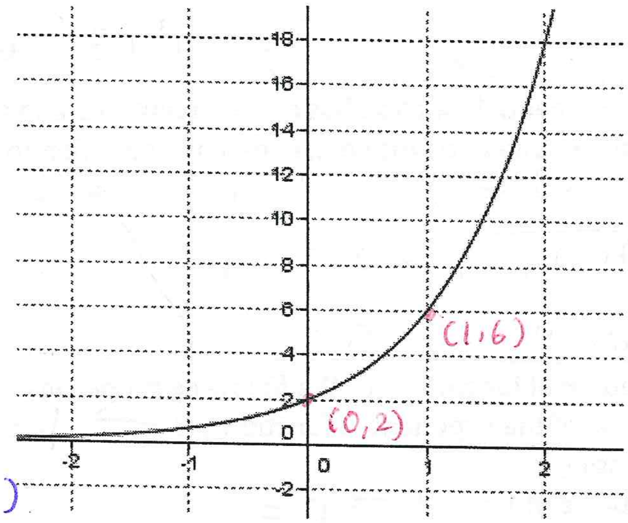
April 20

Write an exponential equation in the form $y = ab^x$ that describes the graph shown.

$a=2$ b/c of y interc

* Table of Value

x	y	Change in y
0	2	
		$\times 3$
1	6	
		$\times 3$
2	18	
		$\times 3$
3	54	



* $y = 2b^x$

sub (1, 6)

$6 = 2 \cdot b^1 \quad \div 2$

$\frac{6}{2}$

$3 = b^1$

$\therefore b = 3$

$\therefore b = 3$ (change in y)

$\therefore a = 2$ (y intercept)

$\therefore y = 2(3)^x$

Write an exponential equation in the form $y = b^x + c$ that describes the graph below.

y intercept: (0, 4)

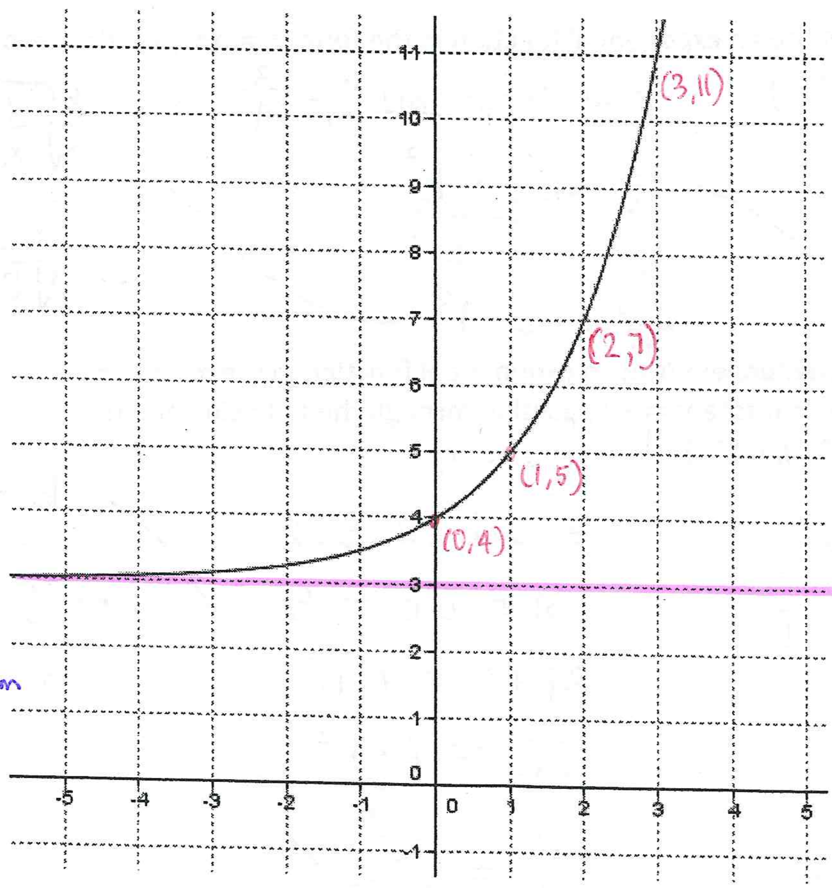
sub $x=0$, $y=4$

$4 = b^0 + c$

$4 = 1 + c$

$3 = c$

$\therefore y = b^x + 3$



$y=3$

asymptote

sub $x=1$, $y=5$ from the point (1, 5)

$5 = b^1 + 3$

$5 - 3 = b$

$2 = b$

$\therefore y = 2^x + 3$

1. Write two different equations to represent an increasing exponential function with an asymptote of $y = 3$. (Assume $a=1$)

* Asymptote is only affected by C or d. $\rightarrow y=3 \rightarrow c=3$

* "b" > 1 if $a>0$

$\therefore y = 2^x + 3$ or $y = 10^x + 3$

2. A decreasing exponential function has a y-intercept of 5 and an asymptote of $y = -4$. Is it still possible to write more than one equation to satisfy the conditions?

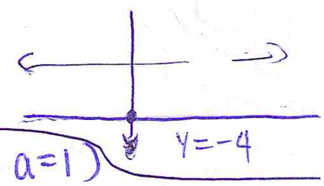
$y=-4 \rightarrow c=-4$ $\quad (0,5) \rightarrow y = ab^x - 4$

$5 = ab^0 - 4$

$5 = a - 4$

$5+4=a$

$\therefore a = 9$



$\therefore y = 9b^x - 4$ and b must be $0<b<1$ Yes it is possible to write more than one equation.

3. Write an exponential function with the following properties: (assume $a=1$)
   - -the base of the exponential function is 3 $\rightarrow b=3$
   - -decreasing
   - -asymptote of $y = -2 \rightarrow c=-2$

* $y = 3^x - 2 \rightarrow$ increase! (not an answer)

$\therefore y = 3^{-x} - 2 \rightarrow$ decrease! correct answer

4. Write an exponential function in the form $y = ab^x$, passing through $(0, 6)$ and $(3, \frac{3}{4})$

sub $x=0$, $=6$

$6 = ab^0$

$6 = a$

$\therefore y = 6b^x$

sub $x=3$ and $y=\frac{3}{4}$

$\frac{\frac{3}{4}}{6} = \frac{6 \cdot b^3}{6}$

$\frac{3}{4 \times 6} = b^3$

$\sqrt[3]{\frac{1}{8}} = \sqrt[3]{b^3}$

$\frac{\sqrt[3]{1}}{\sqrt[3]{8}} = b$

$\therefore b =$

$\therefore y = 6 \cdot ($

5. **Challenge:** Write an exponential function in the form $y = ab^x + c$ with an asymptote $y = -5$, passing through the following points: (0,1), (2, 31). $\rightarrow c=-5$

Sub $(0,1)$

$1 = ab^0 + -5$

$1 = a + -5$

$1 + 5 = a$

$\therefore a = 6$

$\therefore y = 6b^x - 5$

* sub $(2,31)$

$31 = 6b^2 - 5$

$31 + 5 = 6b^2$

$\frac{36}{6} = \frac{6 \cdot b^2}{6}$

$\pm\sqrt{6} = \sqrt{b^2}$

$b = \pm\sqrt{6}$

$\therefore y = 6(\sqrt{6})^x - 5$ or

$y = 6(-\sqrt{6})^x - 5$

Homework: pg. 184 # 1, 2, 4, 5, 10, 12