Warm Up

Determine the common ratio for each of the following:

X	Y1
1	-3
2	-4.5
3	-6.75
4	-10.13

X	Y1
1	.6
2	.12
3	.024
4	.0048

Determine an equation that would define each of the above sets of data:

(Hint: Look around your TI-83 for some help!!)

Transformations of the Exponential Function

$y = a(b)^x$

intial value

base

check with...

Properties:

If $b > 1$, then the graph will be GROWTH

If $0 < b < 1$, then the graph will be DECAY

y - intercept: happens when $x = 0$, so... y-int = a

Transformations of the Exponential Function

(y-Int) $y = a(b)^x + d$

intial value — base — vertical translation

check with...

Properties:

If $b > 1$, then the graph will be GROWTH

If $0 < b < 1$, then the graph will be DECAY

y - intercept: happens when $x = 0$, so... y-int = a + d

Horizontal Asymptote - a horizontal line that a graph approaches but never intersects.

Equation of Horizontal Asymptote will be... $y = d$

Domain - describes all possible x-values
Range - describes all possible y-values

Thus, for exponential functions... Domain: $\{x \in R\}$

Range: $\{y > d\}$

Horizontal Asymptote

Exercise: Complete the following table...

Equation	Growth/Decay	y-intercept	Eq'n for Horizontal Asymptote
$y = 3(5)^x - 4$	G	-1	$y = -4$
$y = 4\left(\frac{2}{5}\right)^x + 1$	D	5	$y = 1$
$y = 2^x - 2$	G	-2	$y = -2$
$y = \frac{3}{4}\left(\frac{1}{2}\right)^x$	D	$3/4$	$y = 0$
$y = 5(3)^x$	G	5	$y = 0$

Homework...

p. 129 #9 - 12

p. 140 #43 (without technology)
#44
#46

Solutions

p. 129 9. b. This graph has a horizontal asymptote at y = 0.
c. The y intercept is at (0 , 2).
e. The graph is a decay curve, since 0 < b < 1.

10.

Question	Function	y-intercept	Growth or decay	Reason
a	$y = 4(3.2)^x$	(0, 4)	growth	b = 3.2 > 1
b	$y = 2.1(0.8)^x$	(0, 2.1)	decay	b = 0.8 < 1
c	$y = 0.3(1.1)^x$	(0, 0.3)	growth	b = 1.1 > 1
d	$y = 0.7(0.85)^x$	(0, 0.7)	decay	b = 0.85 < 1

11. All three functions have a = 1, since they all cross the y axis at y = 1. The function f has a b that is greater than 0 but less than 1, since it is a decay curve. The functions g and h both have a b that is greater than 1, since they are both growth curves. The b in the equation for g will be greater than the b in the equation for h, since the curve for the function g rises at a faster rate than the curve for the function h.

12. a. f has a = 1, g has a = 2 and h has a = 3. We can see this by looking at the y intercepts of each of the graphs. For all three graphs, the ratio of successive y terms is 1.5, so the b for all three is equal to 1.5
b. The equations would be $f(x) = 1.5^x$, $g(x) = 2(1.5)^x$ and $h(x) = 3(1.5)^x$.

p. 140 #43. b)

Equation	Eq'n for Horizontal Asymptote
$y = 2^x$	$Y = 0$
$y = 2^x - 1$	$Y = -1$
$y = 2^x + 3$	$Y = 3$

#44. a) ii b) iv c) v d) vi e) i f) iii

#46.

Equation	Growth/Decay	y-intercept	Eq'n for Horizontal Asymptote
$y = 2^x - 3$	Growth	(0, -2)	$Y = -3$
$y = 2(3)^x + 1$	Growth	(0, 3)	$Y = 1$
$y = 20(0.8)^x - 2.4$	Decay	(0, 17.6)	$Y = -2.4$
$y = 1.7(1.25)^x$	Growth	(0, 1.7)	$Y = 0$