Homework 7.3

Graphed below are two exponential functions of the form $f(x) = a \cdot b^{c(x-h)} + k$. Provide the indicated information for each function. Provide explanation for your conclusions about the values of *a*, *c*, and *k*.

1. Growth or Decay Justification: f(x) is increasing

Left End Behavior $\lim_{x \to -\infty} f(x) = -2$

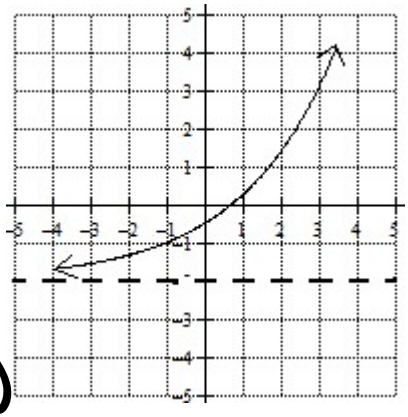
Right End Behavior $\lim_{x \to \infty} f(x) = \infty$

Equation of horizontal asymptote $y = -2$

a: a > 0 b/c f(x) is above HA.

c: c > 0 b/c $\lim_{x \to \infty} f(x) = \infty$ (f(x) goes away from HA)

k: k = -2 b/c HA is at y = -2



2. Growth or Decay Justification: f(x) is decreasing

Left End Behavior $\lim_{x \to -\infty} f(x) = \infty$

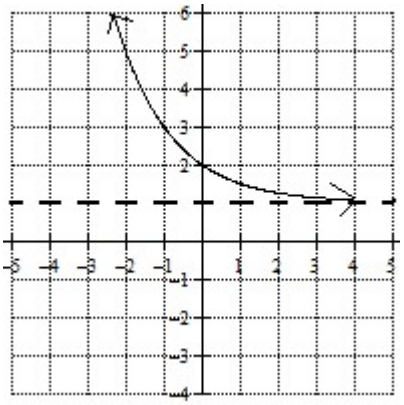
Right End Behavior $\lim_{x \to \infty} f(x) = 1$

Equation of horizontal asymptote $y = 1$

a: a > 0 b/c f(x) is above HA.

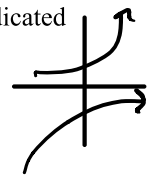
c: c < 0 b/c $\lim_{x \to \infty} f(x) = 1$ (f(x) goes toward HA)

k: k = 1 b/c HA is at y = 1



Equation	How many reflections does the graph undergo? Give reasons for your answer.	What is the value of b? If $0 < b < 1$, reciprocate b and change the sign of the exponent.	Is the function a growth or decay? Give reasons for your answer.	What is the equation of the horizontal asymptote? Does the graph lie above or below?
4. $g(x) = -(0.98)^{x+2} + 3$ $g(x) = -\left(\frac{100}{98}\right)^{-(x+2)} + 3$	$a < 0$ $\therefore$ g(x) has a vertical reflection --- $c < 0$ $\therefore$ g(x) has a horizontal reflection	$b = \frac{100}{98}$	There are two reflections $\therefore$ g(x) is growth	$K = 3$ $\therefore$ HA is $y = 3$ $a < 0$ $\therefore$ g(x) lies below HA
5. $f(x) = \left(\frac{2}{5}\right)^{x} - 2$ $f(x) = \left(\frac{5}{2}\right)^{-x} - 2$	$c < 0$ $\therefore$ f(x) has a horizontal reflection	$b = \frac{5}{2}$	There is one reflection $\therefore$ f(x) is decay	$K = -2$ $\therefore$ HA is $y = -2$ $a > 0$ $\therefore$ f(x) lies above HA
6. $p(x) = -2^{-x+2}$ $p(x) = -2^{-(x-2)}$	$a < 0$ $\therefore$ p(x) has a vertical reflection --- $c < 0$ $\therefore$ p(x) has a horizontal reflection	$b = 2$	There are two reflections $\therefore$ p(x) is growth	$K = 0$ $\therefore$ HA is $y = 0$ $a < 0$ $\therefore$ p(x) lies below HA
7. $g(x) = -(0.0003)^{-x} + 5$ $g(x) = -\left(\frac{10000}{3}\right)^{x} + 5$	$a < 0$ $\therefore$ g(x) has a vertical reflection	$b = \frac{10000}{3}$	There is one reflection $\therefore$ g(x) is decay	$K = 5$ $\therefore$ HA is $y = 5$ $a < 0$ $\therefore$ g(x) lies below HA

Shown below is a table of values for an exponential function of the form $G(x) = a \cdot b^{c(x-h)} + k$. Provide the indicated information for each function. Provide an explanation for your conclusions about the values of *a*, *c*, and *k*.



8.

x	−9	−5	−1	1	3	5	9
$G(x)$	−510	−30	0	1.5	1.875	1.969	1.998

Growth or Decay Justification: G(x) is always increasing

Left End Behavior $\lim_{x \to -\infty} G(x) = -\infty$ Right End Behavior $\lim_{x \to \infty} G(x) = 2$

Equation of horizontal asymptote $y = 2$

a: $a < 0$ b/c all values of $G(x) < 2$, where $y = 2$ is the HA.

c: $c < 0$ b/c $\lim_{x \to \infty} G(x) = 2$ (G(x) goes toward HA)

k: $k = 2$ b/c HA at $y = 2$

Shown below is a table of values for an exponential function of the form $H(x) = a \cdot b^{c(x-h)} + k$. Provide the indicated information for each function. Provide an explanation for your conclusions about the values of *a*, *c*, and *k*.

9.

x	−7	−4	−1	2	5	8	11
$H(x)$	−125	−13	1	2.75	2.969	2.996	2.999

Growth or Decay Justification: H(x) is always increasing.

Left End Behavior $\lim_{x \to -\infty} H(x) = -\infty$ Right End Behavior $\lim_{x \to \infty} H(x) = 3$

Equation of horizontal asymptote $y = 3$

a: $a < 0$ b/c all values of $H(x) < 3$, where $y = 3$ is the HA.

c: $c < 0$ b/c $\lim_{x \to \infty} H(x) = 3$ (H(x) goes toward HA)

k: $k = 3$ b/c HA at $y = 3$