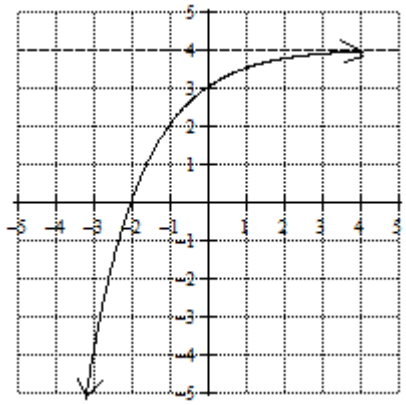
Review 7 Day 1

FRQ 1: Calculator Permitted



The graph of an exponential function, $g(x) = a \cdot b^{-(x-1)} + k$, shown above is such that $g(1) = 3.5$. Use the graph to answer the questions that follow.

a. Determine if $g(x)$ is a growth or a decay function. Give a reason for your answer.

$g(x)$ is increasing

$\therefore$ $g(x)$ is exponential growth. +1

b. Describe the behavior of $g(x)$ as $x \to -\infty$ and as $x \to \infty$ using the words increasing, decreasing, with bound and/or without bound.

$\lim_{x \to -\infty} g(x) = -\infty$ As x goes left, $g(x)$ decreases without bound. +1

$\lim_{x \to \infty} g(x) = 4$ As x goes right, $g(x)$ increases with bound at $y=4$. +1

c. Find the values of a, b, and k and write the equation of $g(x)$. Show your work or explain your decision for each.

$(1, 3.5)$, $k = 4$ +1

$g(x) = a \cdot b^{-(x-1)} + 4$

$3.5 = a \cdot b^{-(1-1)} + 4$

$3.5 = a \cdot b^{-(0)} + 4$

$3.5 = a \cdot b^0 + 4$

$3.5 = a \cdot 1 + 4$

$-0.5 = a$

$-\frac{1}{2} = a$ +1

$(0, 3)$, $k = 4$, $a = -\frac{1}{2}$

$g(x) = a \cdot b^{-(x-1)} + 4$

$3 = -\frac{1}{2} \cdot b^{-(0-1)} + 4$

$3 = -\frac{1}{2} \cdot b^{1} + 4$

$-1 = -\frac{1}{2} \cdot b$

$2 = b$ +1

$g(x) = -\frac{1}{2}(2)^{-(x-1)} + 4$ +1

d. Based on your equation found in part c), do the values of a and b analytically support your response in part a)? Explain your reasoning.

Since $b > 1$ and $a < 0$ and the coefficient of x is negative, $g(x)$ has a vertical and horizontal reflection. +1

$\therefore$ $g(x)$ has exponential growth and is below the H.A. +1

FRQ 2: Calculator Permitted

Consider the exponential function $f(x) = \left(\frac{1}{2}\right)^{x+3} - 4$ to answer the following questions.

a. Classify the function as a growth or decay. Specifically justify each part of your reasoning based on the equation of $f(x)$.

$f(x) = 2^{-(x+3)} - 4$

$a > 0$ ∴ No vertical reflection

$c < 0$ ∴ There is a horizontal reflection

∴ $f(x)$ has 1 reflection +1

∴ f has exponential decay +1

b. Determine the range of $f(x)$ justifying your reasoning based on the equation.

$a > 0$ ∴ $f(x)$ is above HA

$y = -4$ ∴ HA @ $y = -4$ +1

∴ Range $(-4, \infty)$ +1

c. Sketch a graph of $f(x)$. Explain how a, c and the constant effect the parent graph of $y = (2)^x$.

$f(x) = 2^{-(x+3)} - 4$

+1 • f(x) has a constant of -4 ∴ f(x) has HA @ y = -4

+1 • a > 0 ∴ f is above HA

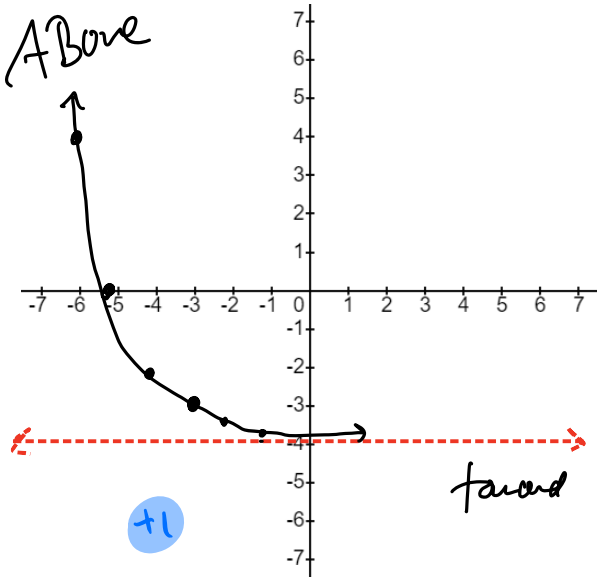
• c < 0 ∴ f goes toward HA

$f(-3) = 2^{-(-3+3)} - 4$

$= 2^{-(0)} - 4$

$= 1 - 4$

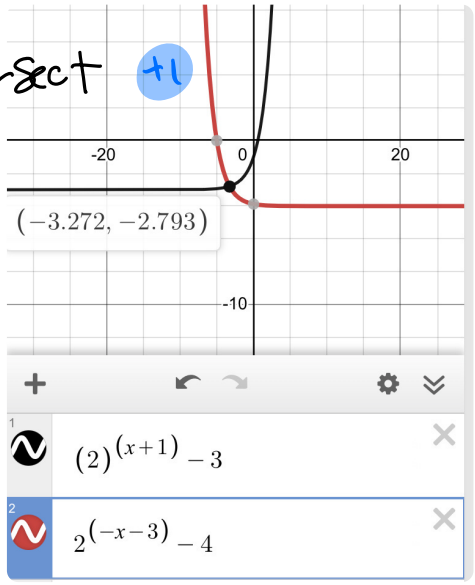
$f(-3) = -3$



d. Suppose that $g(x) = (2)^{x+1} - 3$. Find all value(s) of x at which $f(x) = g(x)$. Interpret your solutions in the context of the graphs of $f(x)$ and $g(x)$.

$f(x) = g(x)$ when graphs intersect +1

$x \approx -3.272$ +1



MULTIPLE CHOICE – Calculator Permitted

1. The point (3, 8) is a point on the graph of an exponential function, $f(x) = (2)^x$. What is the point on the graph of $g(x) = -\left(\frac{1}{2}\right)^{x-4} - 2$ that corresponds to the point (3, 8)?

$g(x) = -(2)^{-(x-4)} - 2$

A. (3, -4) B. (-1, –10) C. (1, –10)

D. (3, 10) E. (–3, -4)

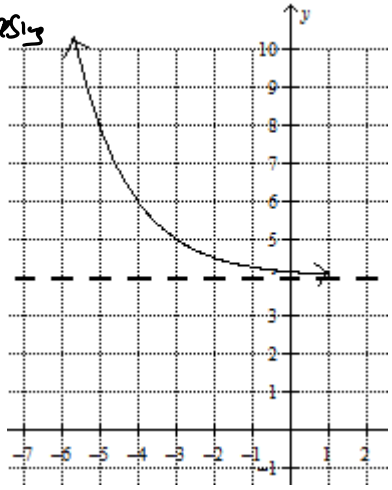
$(x, y) \rightarrow (-x+4, -y-2)$

2. An exponential function, $f(x) = b^{c(x-h)} + k$, is pictured to the right. Which of the following statements is/are true?

I. The function is a growth function. False, decreasing

II. a < 0. False, above HA

III. The value of k is 4. True, HA @ $y = 4$



A. I, II and III
B. I only
C. III only
D. I and II only
E. I and III only

3. Solve the equation for x: $\frac{8^{2x+4}}{4^{x-3}} = 4^{x+5}$

A. $x = -4$
B. $x = 4$
C. $x = \frac{1}{4}$
D. $x = \frac{3}{4}$
E. no solution

$\frac{2^{3(2x+4)}}{2^{2(x-3)}} = 2^{2(x+5)}$

$2^{3(2x+4) - 2(x-3)} = 2^{2(x+5)}$

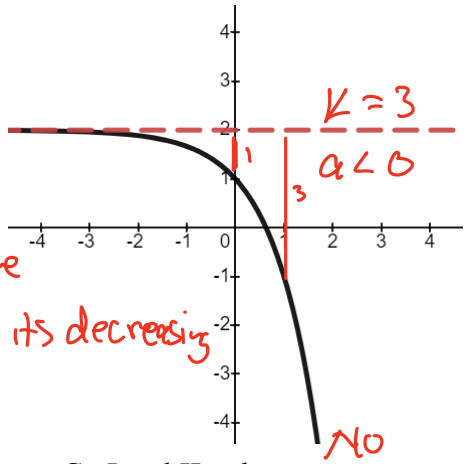
$6x + 12 - 2x + 6 = 2x + 10$

$4x + 18 = 2x + 10$

$2x = -8$

$x = -4$

The graph of an exponential function, $F(x) = a \cdot b^{c(x+1)} + k$ is pictured to the right. Use the graph to answer questions 4 – 6.



4. Which of the following statements is/are true about the graph of the function.

neg. 3 = neg

I. It can be concluded that the value of $a \cdot k > 0$. Fal 8

II. As $x \to \infty$, the graph of $F(x)$ decreases without bound. True

III. The graph of $F(x)$ is an example of an exponential decay function. True, its decreasing

A. I only B. II only C. I and II only

D. III only E. II and III only

a < 0
c > 0

5. Which of the following statements is true about the values of a and c in the equation of $F(x)$?

A. The value of $a < 0$ and the value of $c < 0$.

B. The value of $a < 0$ and the value of $c > 0$.

C. The value of $a > 0$ and the value of $c > 0$.

D. The value of $a > 0$ and the value of $c < 0$.

E. The value of $a < 0$ but no conclusion can be made about the value of c.

6. What is the value of b in the equation of the function $F(x)$?

A. $b = 1$ B. $b = 2$ C. $b = 3$

D. $b = 4$ E. $b = 5$

7. Solve the exponential equation: $2^{x-4} \cdot 7^{x+3} = -5^{2x-4} + 6$

A. -0.483 B. -0.740 C. 0.483

D. 0.740 E. 6