# Homework 7.5

Answer the questions for each of the exponential functions below. Be sure to give justification when asked to do so.

1. $H(x) = -(0.25)^{-x+2} + 3$

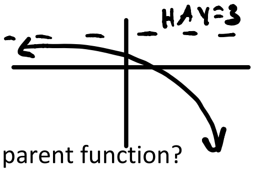
$\frac{100}{25} = 4$

a. Is the function a growth or a decay? Justify your answer.

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

H(x) has a vertical reflection

∴ H(x) is decaying




b. What is the parent function? How is this function's graph different from that of the parent function?

$y = 4^x$

1) reflect over x-axis

2) Translate right 2 and up 3

c. What is the domain?

$(-\infty, \infty)$

d. What is the range?

$(-\infty, 3)$

e. What is the equation of the horizontal asymptote?

$y = 3$

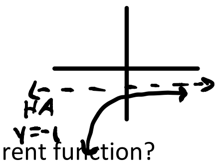
2. $G(x) = -2\left(\frac{1}{2}\right)^{x+3} - 1$

a. Is the function a growth or a decay? Justify your answer.

$G(x) = -2(2)^{-(x+3)} - 1$

G(x) has a horizontal and vertical reflection

∴ G(x) is growing




b. What is the parent function? How is this function's graph different from that of the parent function?

$y = 2^x$

1) Reflect vertically & horizontally

2) Stretch vertically by 2

3) Translate left 3 and down 1

c. What is the domain?

$(-\infty, \infty)$

d. What is the range?

$(-\infty, -1)$

e. What is the equation of the horizontal asymptote?

$y = -1$

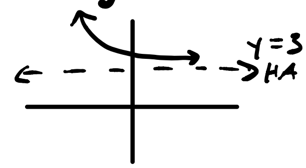
3. $H(x) = 2(1.25)^{-x+2} + 3$

a. Is the function a growth or a decay? Justify your answer.

$H(x) = 2(1.25)^{-(x-2)} + 3$

H(x) has a horizontal reflection

∴ H(x) is decaying




b. What is the parent function? How is this function's graph different from that of the parent function?

$y = (1.25)^x$

1) Reflect horizontally

2) Stretch vertically by 2

3) Translate right 2 and up 3

c. What is the domain?

$(-\infty, \infty)$

d. What is the range?

$(3, \infty)$

e. What is the equation of the horizontal asymptote?

$y = 3$

4. Consider the two functions below to answer the questions that follow:

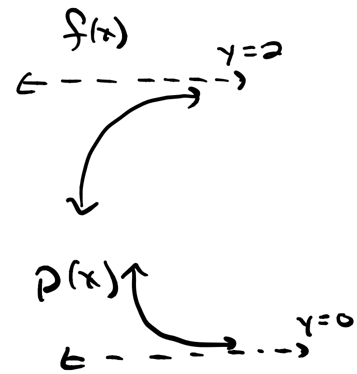
$f(x) = -\left(\frac{3}{2}\right)^{-x-1} + 2$ $\qquad\qquad$ $p(x) = (0.5)^{x-2}$

a. One of the functions is a growth and one is a decay. Which is which and how do you know based on the equations?

$f(x) = -\left(\frac{3}{2}\right)^{-(x+1)} + 2$ $\qquad$ $p(x) = (2)^{-(x-2)}$

f(x) has a horizontal and vertical reflection
$\therefore$ f(x) is growth

p(x) has a horizontal reflection
$\therefore$ p(x) is decay.




b. What is the range of *f*(*x*)? Explain how you know based on the equation of the function.

f(x) is increasing and below the HA of y = 2 (Due to double reflection)

$\therefore$ f(x) has a range of $(-\infty, 2)$

c. The point (−2, 4) is a point on the graph of *y* = $(0.5)^x$. What is the corresponding point on the graph of *p*(*x*)? Explain your reasoning.

$y = (2)^{-x}$
$p(x) = (2)^{-(x-2)}$

p(x) is translated right 2 from $y = (2)^{-x}$
$\therefore (-2, 4) \Rightarrow (0, 4)$

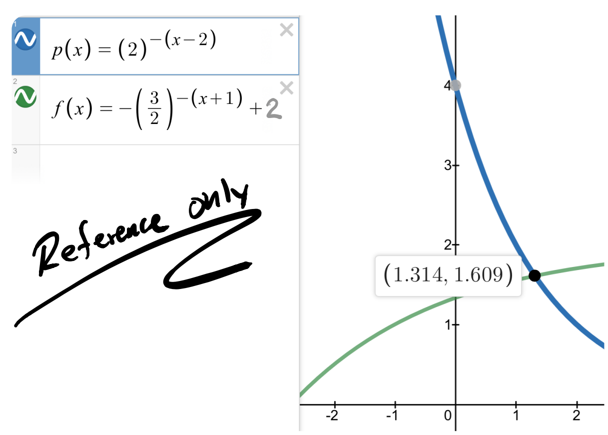
d. For what value(s) of *x* is *f*(*x*) = *p*(*x*)? Round your answer(s) to the nearest thousandth and explain how you determined the value(s).

$f(x) = -\left(\frac{3}{2}\right)^{-(x+1)} + 2$ $\qquad$ $p(x) = (2)^{-(x-2)}$

$-\left(\frac{3}{2}\right)^{-(x+1)} + 2 = (2)^{-(x-2)}$

$x \approx 1.314$

Graphically f(x) = p(x)
when f(x) crosses p(x).



5. Consider $g(x) = (2)^{x+2} - 2$

a. Explain what changes would be made to the graph of $y = (2)^x$ to obtain the graph of $g(x)$.

• Translate left 2 and down 2

b. What $(x, y)$ coordinate rule would transform points on the graph of $y = (2)^x$ into points on the graph of $g(x)$?

$(x, y) \longrightarrow (x-2, y-2)$

c. draw the graph of $g(x)$.

• $g(x)$ has a constant of $-2$

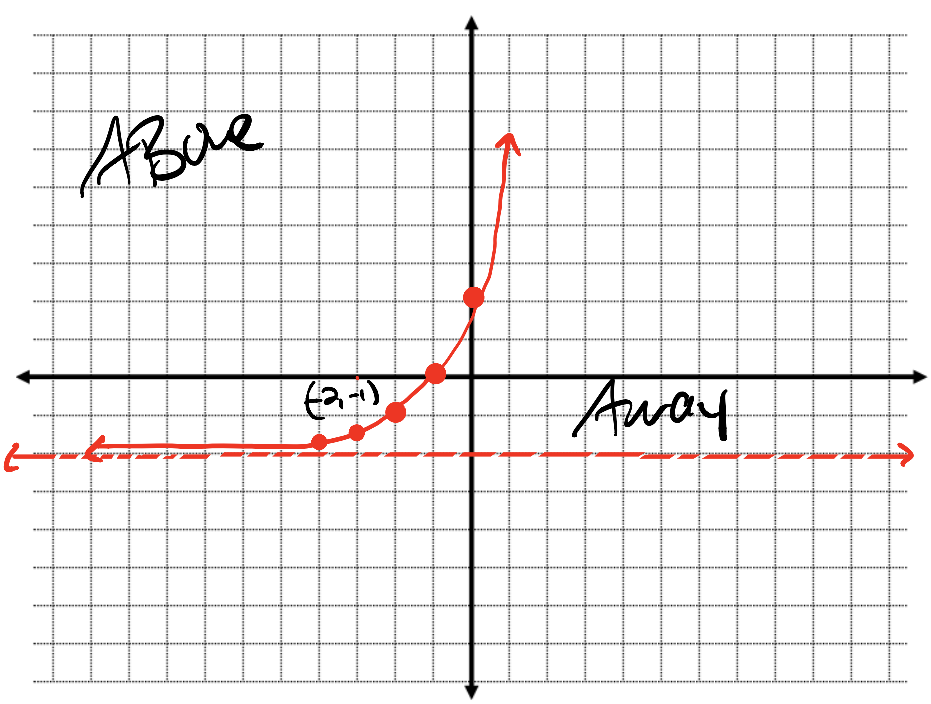
$\therefore$ $g(x)$ has HA @ $y=-2$

• $a>0$ $\therefore$ $g(x)$ is above HA

• $c>0$ $\therefore$ $g(x)$ goes away from HA

• $(x, y) \longrightarrow (x-2, y-2)$

$(0,1) \longrightarrow (-2,-1)$



6. Consider $f(x) = -(2)^{x-3} - 2$

a. Explain what changes would be made to the graph of $y = (2)^x$ to obtain the graph of $f(x)$.

vertical reflection

Translate right 3 and down 2

b. What $(x, y)$ coordinate rule would transform points on the graph of $y = (2)^x$ into points on the graph of $f(x)$?

$(x, y) \rightarrow (x+3, -y-2)$

c. draw the graph of $g(x)$

- $g(x)$ has a constant of $-2$
  $\therefore$ $g(x)$ has HA @ $y = -2$
- $a < 0$ $\therefore$ $g(x)$ is below HA
- $c > 0$ $\therefore$ $g(x)$ goes away from HA
- $(x, y) \rightarrow (x+3, -y-2)$
  $(0, 1) \rightarrow (3, -3)$