

King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math 002 - Term 062
Quiz#1 (4.2 - 4.5)

Name: _____ ID: _____ S/N: _____ Sec.: _____

Question1:

For the function

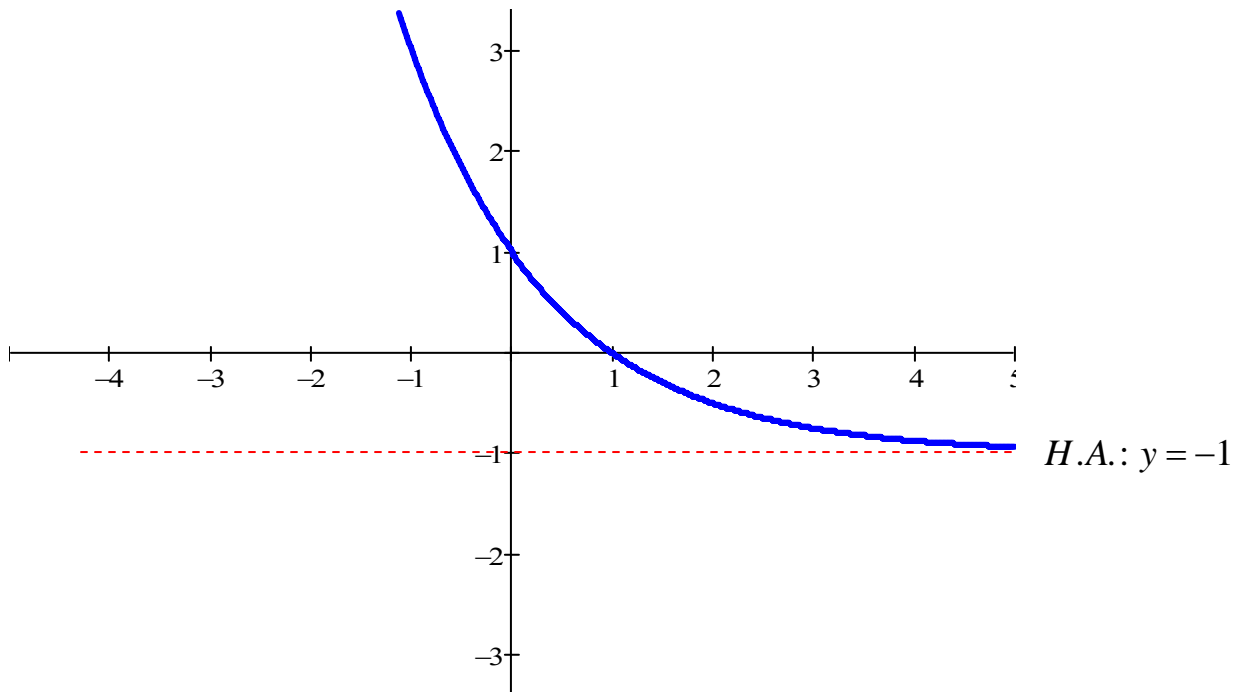
$$f(x) = 2^{-x+1} - 1$$

- a) Sketch the graph of $f(x)$ (Show the x -intercept, the y -intercept, and the asymptote(s) on the graph **(4pts)**
- b) Find $f^{-1}(x)$ **(2pts)**
- c) Find the range of $f(x)$ **(1pts)**

Solution

a) **Solution**

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



$$b) \quad f(x) = \left(\frac{1}{2}\right)^{x-1} - 1$$

Solution:

Let $f(y) = x$ and solve for y .

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

Therefore, $f^{-1}(x) = 1 + \log_{\frac{1}{2}}(x + 1)$.

$$c) \quad R = (-1, \infty)$$

Question2:

(3pts)

Solve the equation $\log_3(-x) + \log_3(6 - x) = 3$

Solution:

$$\log_3(-x) + \log_3(6 - x) = 3$$

$$\log_3(-x(6 - x)) = 3$$

$$-6x + x^2 = 27$$

$$x^2 - 6x - 27 = 0$$

$$(x - 9)(x + 3) = 0$$

$$x = 9 \text{ or } x = -3$$

Check :

$x = 9$ rejected

$x = -3$ accepted

Hence, $S.S. = \{-3\}$

