

King Fahd University of Petroleum and Minerals
University Diploma Programs
Math 004 (032)
Quiz # 1

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Name :

ID:

1) Find the solution set of the inequality

$$-\log_2(x-1) > 2 \Rightarrow x-1 > 0 \Rightarrow x > 1$$

$$\log_2(x-1) < -2 \Rightarrow (x-1) < 2^{-2} \Rightarrow x-1 < \frac{1}{4}$$

$$\Rightarrow x < \frac{5}{4} \text{ and } x > 1 \Rightarrow S.S. = \left(1, \frac{5}{4}\right)$$

2) Solve each of the following equations for x

(a) $\log_2 \sqrt{x-2} + \log_4(x-4) = \frac{1}{2}(3 + \log_2 3)$

$$\Rightarrow 2 \log_2 \sqrt{x-2} + 2 \log_4(x-4) = 3 + \log_2 3$$

$$\Rightarrow \log_2(x-2) + 2 \frac{\log_2(x-4)}{\log_2 4} - \log_2 3 = 3$$

$$\Rightarrow \log \frac{(x-2)(x-4)}{3} = 3^3 \Rightarrow x^2 - 6x - 16 = 0 \Rightarrow x = 8, -2$$

Check: $x = -2$ is rejected $\Rightarrow S.S. = \{8\}$

$$(\log x)^2 + 2 - \log x^3 = 0 \Rightarrow (\log x)^2 - 3 \log x + 2 = 0$$

(b) $\Rightarrow (\log x - 2)(\log x - 1) = 0$

$$\Rightarrow \log x = 2 \text{ or } \log x = 1$$

$$\Rightarrow x = 10^2 \text{ or } x = 10^1 \Rightarrow \text{Check : } S.S. = \{10, 100\}$$

$$(e^x - 3)(e^x + 1) = -3 \Rightarrow e^{2x} - 2e^x = 0$$

(c) $\Rightarrow e^x(e^x - 2) = 0 \Rightarrow e^x = 0$ which is not possible

$$\text{or } e^x = 2 \Rightarrow x = \ln 2$$

3) Simplify the following

$$\begin{aligned} & (\log_9 35 - \log_9 7)(\log_5 9) + \left[\sqrt{7} \right]^{\frac{\log 35}{\log 7}} \\ & \log_9 \left(\frac{35}{7} \right) \log_5 9 + 7^{\frac{1}{2} \log_7 35} \\ & = \log_9 5 \cdot \frac{\log_9 9}{\log_9 5} + 7^{\log_7 \sqrt{35}} \\ & = 1 + \sqrt{35} \end{aligned}$$

4) If $\log 2 = x$ and $\log 3 = t$, find:

$$(a) \log_4 6 = \frac{\log_2 2 \cdot 3}{\log_2 4} = \frac{\log_2 2 + \log_2 3}{2 \log_2 2} = \frac{x + t}{2x}$$

$$(b) \log 5000 = \log 5 + \log 10^3 = \log \frac{10}{2} + 3 = \log 10 - \log 2 + 3 = 4 - x$$