King Fahd University of Petroleum and Minerals
Prep-Year Math Program
Math 002 - Term 062
Recitation Hour (4.4 & 4.5)

Question1

a) Expand the logarithm $\log \sqrt[5]{\dfrac{x^2\, z^2}{(y^4+2)}}$

Solution

$$\frac{1}{5}\left[\log x^2 + \log z^2 - \log(y^4+2)\right] = \frac{2}{5}\log x + \frac{2}{5}\log z - \frac{1}{5}\log(y^4+2)$$

b) If x and y are any positive real number, then write the logarithmic expression $-2 + \log_3 x^2 + \log_{\frac{1}{3}} xy$ as a single logarithm of base 3.

Solution

$$\text{The given expression} = -2\log_3 3 + \log_3 x^2 + \frac{\log_3 xy}{\log_3 1/3}$$

$$= \log_3 3^{-2} + \log_3 x^2 - \log_3 xy$$

$$= \log_3 \frac{3^{-2} x^2}{xy}$$

$$= \log_3 \left(\frac{x}{9y}\right)$$

Question2:

If $\log 2 = .3$ and $\log 3 = .5$, then find the value of

1) $\log 6$
2) $\log 5$
3) $\log_5 600$

See the solution in the notes

Question3:

Find the exact value of

1) $\dfrac{\log_5 32}{\log_5 2}$

2) $\ln(\ln e) + e^{1-2\ln 3}$ **See the solution in the notes**

3) $(\sqrt{3})^{\frac{1}{\log_4 3}}$

Question4:

Solve the following equations

1) $(\dfrac{1}{9})^{(3-x)} = (81)^{2x-5}$

Solution

$$(\frac{1}{9})^{(3-x)} = (81)^{2x-5}$$
$$\Rightarrow 9^{-(3-x)} = 9^{2(2x-5)}$$
$$\Rightarrow 9^{-3+x} = 9^{4x-5}$$
$$\Rightarrow -3 + x = 4x - 5$$
$$\Rightarrow -3x = -2$$
$$\Rightarrow x = 2/3$$

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

Solution

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

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

$\Rightarrow -6x+x^2=3^3=27$

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

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

$\Rightarrow x=9 \quad \text{or} \quad x=3$

Check : $x=9$: Rejected

$x=-3$: *ok*

$\therefore S.S.=\{-3\}$

Question5:

TRUE or FALSE

1) $\log x^2=(\log x)^2$ **False**

2) $\log(3+3)=\log 3+\log 3$ **False**

3) $\log(1+2+3)=\log 1+\log 2+\log 3$ **True**

4) If x is any nonzero real number, then $\log x^2=2\log x$ **False**

5) If $\log_{\frac{1}{2}} x > 0$, then $x\in(0,1)$ **True**