

$$1) a) \log_{1/3} 27 = x$$

$$\left(\frac{1}{3}\right)^x = 27$$

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

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

$$3 = -x$$

$$x = -3 //$$

$$b) \log_3 x = 0$$

$$3^0 = x$$

$$x = 1 //$$

$$b) \log_3 x = 3$$

$$5^3 = x$$

$$x = 125 //$$

$$c) \log_x \frac{1}{9} = 2$$

$$x^2 = \frac{1}{9}$$

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

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

$$x^2 = 3^{-2}$$

$$\sqrt{x^2} = \sqrt{\frac{1}{9}}$$

$$x = \sqrt{\frac{1}{9}}$$

$$x = \frac{1}{3} //$$

$$2) a) \log_3 1000$$

$$= 2.9 //$$

$$b) \log_{10} 50$$

$$= 1.6989 //$$

$$c) \log_{10} (-1000)$$

Syntax error.

3) Solve for x

$$a) \log_9 \sqrt[4]{9} = x$$

$$\sqrt[4]{9} = 9^x$$

$$9^{1/4} = 9^x$$

$$\frac{1}{4} = x$$

$$x = 0.25 //$$

$$b) \log_5 625 = x$$

$$625 = 5^x$$

$$5^4 = 5^x$$

$$x = 4 //$$

$$4) \begin{aligned} \log 2 &= 0.3010 \\ \log 3 &= 0.4771 \\ \log 5 &= 0.6990 \\ \log 7.5 &= ? \end{aligned}$$

$$\log 7.5 = \frac{\log 2}{2} + \frac{\log 3}{2} + \log 5$$

$$= \frac{0.3010}{2} + \frac{0.4771}{2} + 0.6990$$

$$= 0.1505 + 0.23855 + 0.6990$$

$$\log 7.5 = 1.08805 //$$

$$5) a) 16 = 2^4 \quad b) 16 = 4^2 \quad c) 27 = 3^3$$

$$\log_2 16 = 4 // \quad \log_4 16 = 2 // \quad \log_3 27 = 3 //$$

$$d) 134.896 = 10^{2.13} \quad e) 8.414867 = e^{2.13}$$

$$\log_{10} 134.896 = 2.13 // \quad \log_e 8.414867 = 2.13 //$$

$$b) i) \log_3 x^2 y^2$$

$$= \log_3 x^2 + \log_3 y^2$$

$$= 2 \log_3 x + 2 \log_3 y //$$

$$ii) \log_2 \frac{x^2+1}{2^x}$$

$$\log_2 x^2 + 1 - \log_2 2^x$$

$$2 \log_2 (x+1) - x \log_2 2 //$$

$$iii) \log_3 2 - \log_3 4 + \log_3 4^2 - \log_3 \frac{8}{4}$$

$$\log_3 2 - \log_3 4 + 2 \log_3 4 - \log_3 \frac{8}{4} //$$



$$\begin{aligned} \text{i)} \quad \log y - \frac{1}{3} \log 8 &= \log 5 & \text{ii)} \quad \log_b y &= 2 \\ \log y - \log 8^{\frac{1}{3}} &= \log 5 & y &= b^2 \\ \log\left(\frac{y}{8^{\frac{1}{3}}}\right) &= \log 5 & y &= 3b // \end{aligned}$$

$$\frac{y}{8^{\frac{1}{3}}} = 5$$

$$y = 5 \times 8^{\frac{1}{3}}$$

$$y = 5 \times 2^{\frac{4}{3}}$$

$$y = 10 //$$

$$\begin{aligned} \text{8)} \quad \log_2 \frac{1}{16} &= -4 \\ \frac{1}{16} &= 2^{-4} // \end{aligned}$$

$$\begin{aligned} \text{9)} \quad 4^{\log_4 64} & \\ &= 4^{\log_4 64} = x \\ &= 4^{64} = 4^x \\ &= 4^{4^3} = 4^x \\ &= 4^3 \\ &= 64 // \end{aligned}$$

$$\begin{aligned} \text{10)} \quad \log_3(4x+10) &= \log_3(x+1) \\ \log_3(4x+10) &= \log_3(x+1) \\ 4x+10 &= x+1 \\ 4x-x &= 1-10 \\ 3x &= -9 \\ x &= -3 // \end{aligned}$$