

$$9. a) \quad 6^x + 10 = 47$$

$$6^x = 37$$

$$\log_6 37 = x$$

$$b) \quad \left(\frac{1}{8}\right)^x = 2^{x+3}$$

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

$$2^{-3x} = 2^{x+3} \rightarrow -3x = x+3 \rightarrow x = -3/4$$

OR $\log_2 \left(\frac{1}{8}\right)^x = \log_2 2^{x+3}$

$$x \log_2 \frac{1}{8} = (x+3) \log_2 2$$

$$x \cdot (-3) = (x+3) \cdot 1$$

etc.

$$c) \quad \log 5x + \log(x-1) = 2$$

$$\log 5x(x-1) = 2$$

$$10^2 = 5x(x-1)$$

$$5x^2 - 5x - 100 = 0$$

$$x^2 - x - 20 = 0$$

$$(x+4)(x-5) = 0$$

$$x = -4, \boxed{x = 5}$$

$$d) \quad 5^x = e^{2x+1}$$

$$\ln 5^x = \ln e^{2x+1}$$

$$x \ln 5 = 2x+1$$

$$x \ln 5 - 2x = 1$$

$$x(\ln 5 - 2) = 1$$

reject
b/c $\log(5(-4))$
is undefined

$$x = \frac{1}{\ln 5 - 2}$$

$$7) \log_5 1 = 0 \quad \text{b/c} \quad 5^0 = 1$$

$$\log_3 9 = 2 \quad \text{b/c} \quad 3^2 = 9$$

$$\log_{16} 4 = 1/2 \quad \text{b/c} \quad 16^{1/2} = 4$$

$$\log_4 \frac{1}{64} = -3 \quad \text{b/c} \quad 4^{-3} = \frac{1}{4^3}$$

$$\log_5 \sqrt[3]{25} = \frac{1}{3} \log_5 25 = \frac{1}{3} \cdot 2 = 2/3$$

$$\log_4 192 - \log_4 3 = \log_4 (192/3) = \log_4 64 = 3$$

$$8. \text{ Given } \ln 2 \approx .69, \ln 5 \approx 1.61$$

$$\ln 25 = \ln 5^2 = 2 \ln 5 = 2(1.61)$$

$$\ln \frac{2}{5} = \ln 2 - \ln 5 = .69 - 1.61$$

$$\ln 2e = \ln 2 + \ln e = .69 + 1$$

$$\log_2 5 = \frac{\ln 5}{\ln 2} = \frac{1.61}{.69}$$

$$\ln \frac{1}{2} = \ln 1 - \ln 2 = 0 - 0.69$$