

More Review Problems

① a. $\log_3 \frac{x}{2} + \log_3 16 - \log_3 4$
 $= \log_3 \frac{16x}{2} - \log_3 4$
 $= \log_3 8x - \log_3 4$
 $= \log_3 \left(\frac{8x}{4}\right)$
 $= \log_3 2x$

b. $f(0.5) = \log_3 2(0.5)$
 $= \log_3 1$
 $= \boxed{0}$
 $f(4.5) = \log_3 2(4.5)$
 $= \log_3 9$
 $= \boxed{2}$

② Use $n = 800 e^{0.13t}$
a. $n(0) = 800 e^{(0.13)(0)} = \boxed{800}$

b. $3000 = 800 e^{.13t}$
 $3.75 = e^{.13t}$
 $e^{.13t} = 3.75$

$\log_e 3.75 = .13t$
 $\boxed{10.2 = t}$

c. $1600 = 800 e^{.13t}$
 $2 = e^{.13t}$
 $e^{.13t} = 2$

$\log_e 2 = .13t$
 $\boxed{5.33 = t}$

③ Use $V = 10,000 e^{-.3t}$
 $1500 = 10,000 e^{-.3t}$
 $.15 = e^{-.3t}$
 $e^{-.3t} = .15$

$\log_e .15 = -.3t$

$6.33 = t \rightarrow$ so at the end of the 7th year.

④ a. $p = 100 e^{.05(0)} = 100$

b. $2000 = 100 e^{.05t}$
 $20 = e^{.05t}$
 $e^{.05t} = 20$

$\log_e 20 = .05t$
 $\boxed{59.9 = t}$

$$\begin{aligned} \textcircled{5} \quad y &= 1000(1+.15)^t \\ 3000 &= 1000(1.15)^t \\ 3 &= 1.15^t \\ 1.15^t &= 3 \\ \log_{1.15} 3 &= t \\ \boxed{7.86} &= t \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad \log_2 x + \log_2 (x-2) &= 3 \\ \log_2 (x^2 - 2x) &= 3 \\ 2^3 &= x^2 - 2x \\ x^2 - 2x - 8 &= 0 \\ (x-4)(x+2) &= 0 \\ x &= 4, -\cancel{2} \end{aligned}$$

$$\textcircled{7} \quad \text{a. } \log_2 32 = 5$$

$$\text{b. } \log_2 \left(\frac{32^x}{8^y} \right) =$$

$$\begin{aligned} \log_2 32^x - \log_2 8^y &= \\ x \log_2 32 - y \log_2 8 &= \\ \boxed{5x - 3y} & \end{aligned}$$

$$\textcircled{8} \quad \text{a. } \log_5 x^2 = 2 \log_5 x = \boxed{2y}$$

$$\text{b. } \log_5 \left(\frac{1}{x} \right) = \log_5 (x^{-1}) = -1 \log_5 x = \boxed{-y}$$

$$\text{c. } \log_{25} x = \frac{\log_5 x}{\log_5 25} = \frac{\log_5 x}{2} = \boxed{\frac{y}{2} \text{ or } \frac{1}{2}y}$$