MAC1105 Test 5   Name _____ _Key_____

(Deb Howard 3-16)

$A = Pe^{rt}$

$A = P\left(1 + \dfrac{r}{n}\right)^{nt}$

$pH = -log[H^+]$

$L = 10log\left(\dfrac{I}{I_0}\right)$

$R = log\left(\dfrac{I}{I_0}\right)$

1. Find the concentration of hydrogen ions if the pH of lemonade is 2.1.

(10)

$pH = -log[H^+]$

$2.1 = -log[H^+]$

$-2.1 = log[H^+]$

$\boxed{10^{-2.1} = H^+ = 0.0079}$

2. You invest $50,000 in a fund compounded annually at 4% interest. How much will the amount become after 10 years?

(10)

$P = 50,000 \quad n = 1 \quad r = 0.04 \quad t = 10$

$A = P\left(1 + \dfrac{r}{n}\right)^{nt}$

$A = 50,000\left(1 + \dfrac{0.04}{1}\right)^{(1*10)} = \boxed{\$74012.21}$

3. Solve **algebraically.**   How many years will it take $50,000 to grow to be $150,000 in a fund compounded continuously at 4%?

(10)

$P = 50,000 \qquad A = 150,000 \qquad r = 0.04$

$A = Pe^{rt}$

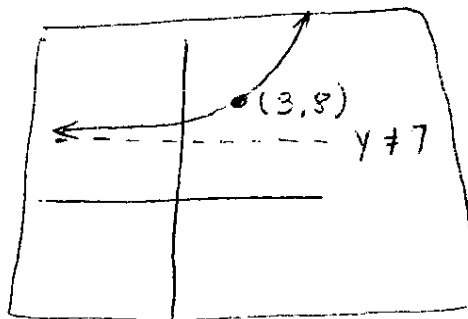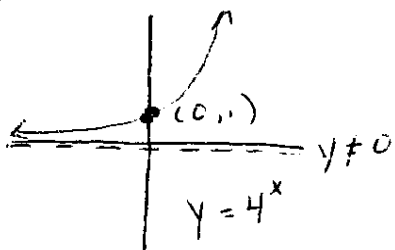$\dfrac{150,000}{50,000} = \dfrac{50,000\,e^{0.04t}}{50,000}$

$3 = e^{0.04t}$

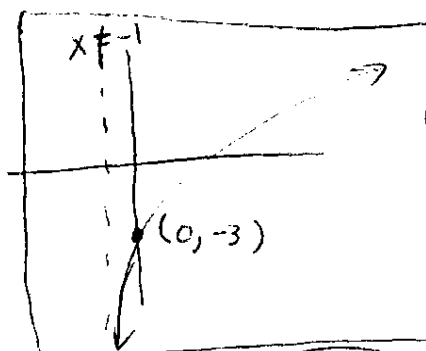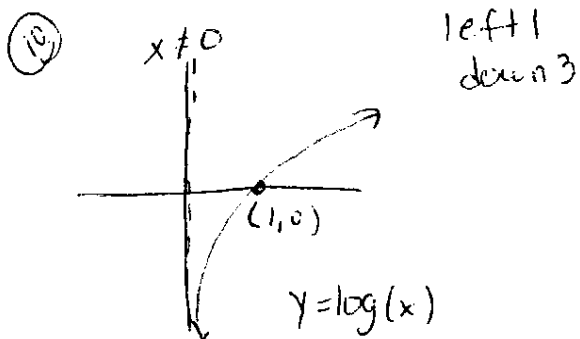$\dfrac{ln(3)}{0.04} = \dfrac{0.04t}{0.04}$

$\boxed{t = \dfrac{ln(3)}{0.04} = 27.5 \text{ years}}$

4. Sketch a complete graph of each of the following. Include the equation of the asymptote, as well as, the coordinate of the shifted point.

a.) $f(x) = 4^{x-3} + 7$ right 3, up 7

(0,1) $y \neq 0$

$y = 4^x$

(3,8) $y \neq 7$

b.) $f(x) = \log(x + 1) - 3$

left 1
down 3

$x \neq 0$

(1,0)

$y = \log(x)$

$x \neq -1$

(0,-3)

5. Rewrite as a single logarithm. $3\log(y) + 2\log(z) - 4\log(x + 1)$

$\log(y^3) + \log(z^2) - \log(x+1)^4$

$$\log\left(\frac{y^3 z^2}{(x+1)^4}\right)$$

6. Simplify the following to 4 decimal places:

a.) $\log(3.4) = \boxed{0.5315}$

b.) $\log_3(5) = \dfrac{\ln(5)}{\ln(3)} = \boxed{1.4650}$

7. A color TV loses 30% of its value every 2 years. The value of a TV set t years
after it was purchased for \$700 is given by the function $V(t) = 700(0.7)^{t/2}$.
Calculate the value of the TV in 5 years by a method of your choice.

$$V(t) = 700(0.7)^{t/2}$$

$$t = 5$$

$$V(t) = 700(0.7)^{(5/2)} = \boxed{286.97}$$

8. Solve algebraically.

$$x > 0 \qquad x-3 > 0$$

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

$$\log_3\left(\frac{x}{x-3}\right) = 2$$

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

$$\frac{9}{1} = \frac{x}{x-3}$$

$$9(x-3) = 1(x)$$

$$9x - 27 = x$$

$$8x = 27$$

$$\boxed{x = \frac{27}{8} = 3.375}$$

Check!

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