

AFM - 4.4 WS - Exp/Log WP

1) a) $a = 65000$
 $r = .16$

$$A = 65000(1+.16)^t$$

$$A = 65000(1.16)^t$$

b) $a = 65000$
 $r = .16$

$$t = 1872 - 1865 \Rightarrow$$

$$A = ?$$

$$A = 65000(1+.16)^7$$

$$A = 183704 \text{ rabbits}$$

c) $\frac{250000}{65000} = \frac{65000(1.16)^t}{65000}$

$$3.846154 = (1.16)^t$$

$$\frac{\log 3.846154}{\log(1.16)} = \frac{t \log(1.16)}{\log(1.16)}$$

$$t = 9.1 \text{ years}$$

$$1865 + 9 = 1874$$

2) a) $\frac{25962}{9250} = \frac{9250(1+r)^{30}}{9250}$

$$2.806703 = (1+r)^{30}$$

$$\sqrt[30]{2.806703} = \sqrt[30]{(1+r)^{30}}$$

$$1.035 = 1+r$$

$$\underline{1} \quad \underline{1}$$

$$.035 = r$$

$$\text{rate} = 3.5\%$$

3) a) $a = 300000$
 $r = .2$

$$A = 300000(1-.2)^t$$

$$A = 300000(.8)^t$$

b) $\frac{75000}{300000} = \frac{300000(1-.2)^t}{300000}$

$$.25 = (.8)^t$$

$$\frac{\log .25}{\log .8} = \frac{t \log(.8)}{\log .8}$$

$$\log .8 \quad \log .8$$

$$t = 6.2 \text{ years}$$

b) $A = 9250(1+.035)^t$

$$A = 9250(1.035)^{30}$$

$$A = \$51,660.57$$

c) $\frac{1,000,000}{9250} = \frac{9250(1+.035)^t}{9250}$

$$108.108108 = (1.035)^t$$

$$\frac{\log 108.108108}{\log(1.035)} = \frac{t \log(1.035)}{\log(1.035)}$$

$$\log(1.035) \quad \log(1.035)$$

$$t = 136.1 \text{ years}$$

c) $\frac{60000}{300000} = \frac{300000(.8)^t}{300000}$

$$.2 = (.8)^t$$

$$\frac{\log .2}{\log .8} = \frac{t \log(.8)}{\log .8}$$

$$\log .8 \quad \log .8$$

$$t = 7.2 \text{ years}$$

$$4) P=1500 \quad r=.05 \quad A=?$$

$$a) A = 1500 \left(1 + \frac{.05}{4}\right)^{4 \cdot 6}$$

$$\boxed{A = 82,021.03}$$

$$b) A = 1500 e^{.05(6)}$$

$$\boxed{A = 82,024.79}$$

$$c) \text{ comp'd continuously} \\ \text{by } \$3.76$$

$$6) P=2225 \quad t=5 \quad r=?$$

$$a) \frac{6675}{2225} = \frac{2225}{2225} \left(1 + \frac{r}{12}\right)^{12 \cdot 5}$$

$$3 = \left(1 + \frac{r}{12}\right)^{60}$$

$$\sqrt[60]{3} = \sqrt[60]{\left(1 + \frac{r}{12}\right)^{60}}$$

$$1.01848 = 1 + \frac{r}{12}$$

$$\frac{1}{12} (.01848) = \frac{r}{12} \cdot 12$$

$$r = .2217$$

$$\boxed{\text{rate} = 22.17\%}$$

$$b) \frac{8900}{2225} = \frac{2225}{2225} e^{5r}$$

$$4 = e^{5r}$$

$$\frac{\ln 4}{5} = \frac{5r}{5}$$

$$r = .2773$$

$$\boxed{\text{rate} = 27.73\%}$$

$$5) P=650 \quad r=.07 \quad t=?$$

$$a) \frac{2925}{650} = \frac{650}{650} \left(1 + \frac{.07}{2}\right)^{2t}$$

$$4.5 = (1.035)^{2t}$$

$$\frac{\log 4.5}{(2 \log (1.035))} = \frac{2t \log (1.035)}{(2 \log (1.035))}$$

$$\boxed{t = 21.9 \text{ yrs}}$$

$$b) \frac{1300}{650} = \frac{650}{650} e^{.07t}$$

$$2 = e^{.07t}$$

$$\ln 2 = \ln e^{.07t}$$

$$\frac{\ln 2}{.07} = \frac{.07t}{.07}$$

$$\boxed{t = 9.9 \text{ yrs}}$$

$$7) a.) i) pH = -\log(3.2 \times 10^{-4})$$

$$pH = 3.5 \text{ acidic}$$

$$ii) pH = -\log(5.0 \times 10^{-9})$$

$$pH = 8.3 \text{ basic}$$

$$b) i) \frac{6.5}{-1} = \frac{-\log H}{-1}$$

$$-6.5 = \log H = -6.5$$

$$H = 10^{-6.5}$$

$$H = 3.2 \times 10^{-7} M$$

$$ii) \frac{7.3}{-1} = \frac{-\log H}{-1}$$

$$-7.3 = \log H = -7.3$$

$$H = 10^{-7.3}$$

$$H = 5.01 \times 10^{-8} M$$

$$8) a) D = 10(\log(1.3) + 12)$$

$$D = 121 \text{ dB}$$

$$b) \frac{11.5}{10} = \frac{10(\log I + 12)}{10}$$

$$11.5 = \log I + 12$$

$$\underline{-12} \quad \underline{-12}$$

$$-0.5 = \log I = -0.5$$

$$I = 10^{-0.5}$$

$$I = 3.2 \times 10^{-1} \text{ W/m}^2$$

$$c) 132 = 10(\log I + 12)$$

$$13.2 = \log I + 12$$

$$1.2 = \log I$$

$$I = 10^{1.2}$$

$$2.8 = 10(\log I + 12)$$

$$2.8 = \log I + 12$$

$$-9.2 = \log I$$

$$I = 10^{-9.2}$$

$$\text{ratio} = \frac{10^{1.2}}{10^{-9.2}}$$

$$\text{ratio} = 2.5 \times 10^{10}$$

$$9) a) i) R = 75 - [6 \ln(3+1)]$$

$$R = 66.7 \%$$

$$ii) 25 \text{ WKS} = 7 \text{ months}$$

$$R = 75 - [6 \ln(7+1)]$$

$$R = 63.3 \%$$

$$b) i) 65 = 75 - [6 \ln(t+1)] \quad ii) 33.3 = 75 - [6 \ln(t+1)]$$

$$-10 = -6 \ln(t+1)$$

$$1.6667 = \ln(t+1)$$

$$e^{1.6667} = t+1$$

$$\underline{-1} \quad \underline{-1}$$

$$t = 4.3 \text{ months}$$

$$-41.7 = -6 \ln(t+1)$$

$$6.95 = \ln(t+1)$$

$$e^{6.95} = t+1$$

$$\underline{-1} \quad \underline{-1}$$

$$t = 1,042 \text{ months}$$