PreCal – Exp/Log WPWS

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

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

$\boxed{A = 65000(1.16)^t}$

b) $a = 65000$
$r = .16$
$t = 1872 - 1865 = 7$
$A = ?$

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

$\boxed{A = 183,704 \text{ rabbits}}$

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

$3.846154 = (1.16)^t$

$\log 3.846154 = t \log(1.16)$

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

$t = 9.1 \text{ years}$

$1865 + 9 = \boxed{1874}$

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

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

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

$1.035 = 1 + r$
$-1 \quad -1$

$.035 = r$

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

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

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

$\boxed{A = \$51,660.57}$

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

$108.108108 = (1.035)^t$

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

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

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

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

$\boxed{A = 300000(.8)^t}$

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

$.25 = (.8)^t$

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

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

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

$.2 = (.8)^t$

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

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

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

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

$\boxed{A=\$2{,}021.03}$

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

$\boxed{A=\$2024.79}$

c) compl'd continuously by $3.76

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

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

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

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

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

$-1 \quad -1$

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

$r=.2217$

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

b) $\frac{890}{2225}=\frac{2225e^{5r}}{2225}$

$4=e^{5r}$

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

$r=.2773$

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

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

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

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

$\log 4.5=2t\log(1.035)$

$\left(\frac{\log 4.5}{2\log(1.035)}\right)$

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

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

$2=e^{.07t}$

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

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

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

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

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

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

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

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

$-6.5 = \log H = -6.5$

$H = 10^{-6.5}$

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

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

$-7.3 = \log H = -7.3$

$H = 10^{-7.3}$

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

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

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

b) $\frac{115}{10} = \frac{10(\log I + 12)}{10}$

$11.5 = \log I + 12$

$-12 \quad -12$

$-.5 = \log I = -.5$

$I = 10^{-.5}$

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

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

$13.2 = \log I + 12$

$1.2 = \log I$

$I = 10^{1.2}$

$28 = 10(\log I + 12)$

$2.8 = \log I + 12$

$-9.2 = \log I$

$I = 10^{-9.2}$

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

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

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

$\boxed{R = 66.7}$

ii) 28 wks = 7 months

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

$\boxed{R = 63.3}$

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

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

$1.6667 = \ln(t+1)$

$e^{1.6667} = t+1$

$-1 \quad -1$

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

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

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

$6.95 = \ln(t+1)$

$e^{6.95} = t+1$

$-1 \quad -1$

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