

Ch. 4 Test: Word Problems Review Solutions

1.) $A = P(1 + \frac{r}{n})^{nt}$ * let $P = \text{any Amount}$
 6.4% $\rightarrow A = 1000(1 + \frac{.064}{4})^{4(1)} = \boxed{\$1065.55}$ (6.4% compounded quarterly)
 6.3% $\rightarrow A = 1000(1 + \frac{.063}{12})^{12(1)} = \1064.85

2.) $3375 = 1125(1 + \frac{.08}{12})^{12t}$
 $\frac{3375}{1125} = \frac{1125(1 + \frac{.08}{12})^{12t}}{1125}$
 $3 = (1 + \frac{.08}{12})^{12t}$
 $\ln 3 = \ln(1 + \frac{.08}{12})^{12t}$
 $\ln 3 = 12t \cdot \ln(1 + \frac{.08}{12})$
 $t = \frac{\ln 3}{12 \cdot \ln(1 + \frac{.08}{12})} = 13.8 \text{ yrs} = t$

3.) $2400 = 1900(1 + \frac{r}{1})^{1(13)}$ $\rightarrow \frac{2400}{1900} = \frac{1900(1+r)^{13}}{1900}$
 $\frac{24}{19} = (1+r)^{13} \rightarrow \sqrt[13]{\frac{24}{19}} = [(1+r)^{13}]^{1/13}$

4.) a.) carrying capacity 210 b.) 10 c.) 185.927 d.) 14.9
growth rate 16.8%

$1.02 = 1+r \rightarrow r = 1.02 - 1$ $\boxed{r = .02}$

5.) $\frac{1}{2} A_0 = A_0 e^{K(1690)}$ $\frac{80}{150} = \frac{150e}{150}$
 $\frac{1}{2} = e^{1690K}$ $\ln(\frac{8}{15}) = \frac{\ln \frac{1}{2}}{1690} t \rightarrow \boxed{1533 \text{ yrs} = t}$
 $\ln \frac{1}{2} = \ln e^{1690K}$
 $\ln \frac{1}{2} = 1690K$
 $\frac{\ln \frac{1}{2}}{1690} = K$

$$6.) u(t) = T + (u_0 - T)e^{kt}$$

$$44 = 70 + (35 - 70)e^{k(4)}$$

$$44 = 70 - 35e^{4k}$$

$$44 - 70 = -35e^{4k}$$

$$\frac{-26}{-35} = \frac{-35e^{4k}}{-35}$$

$$\frac{26}{35} = e^{4k}$$

$$\ln \frac{26}{35} = \ln e^{4k}$$

$$\ln \frac{26}{35} = \frac{4k}{1}$$

$$u(10) = 70 - 35e^{10 \left[\frac{\ln \frac{26}{35}}{4} \right]}$$

$$u(10) = 53.35^\circ$$

$$7.) P(t) = 500e^{0.28t}$$

$$\frac{2500}{500} = \frac{500e^{0.28t}}{500}$$

$$5 = e^{0.28t}$$

$$\ln 5 = \ln e^{0.28t}$$

$$\frac{\ln 5}{0.28} = \frac{0.28t}{0.28}$$

$$5.75 \text{ yrs} = t$$

$$8.) \text{Function} = 86.21 - 0.74 \ln x$$

$$84 = 86.21 - 0.74 \ln x$$

$$84 - 86.21 = -0.74 \ln x$$

$$\frac{-2.21}{-0.74} = \frac{-0.74 \ln x}{-0.74}$$

$$e^{2.986} = \ln x$$

$$e^{2.986} = x$$

$$19.806 \approx 20 \text{ months} = x$$

$$9.) P = Ae^{-rt}$$

$$P = 65000e^{-0.09(5)}$$

$$P = \$41,446$$

D = Total distance

$$10.) D = rt$$

$$\frac{D}{60} + \frac{D}{75} = 9$$

$$75D + 60D = 9$$

$$4500 + 4500 = 9$$

$$\frac{135D}{4500} = 9$$

$\frac{1}{2}D$ is distance to home + return

$$D = 300$$