Level 3 Problems:

1. $y = a(1+r)^t$

$2{,}000{,}000 = 1{,}000{,}000(1+.035)^t$

$2 = (1.035)^t$

$\log 2 = \log 1.035^t$

$\log 2 = t \log 1.035$

$\frac{\log 2}{\log 1.035} = t$

$20 = t$

2. $y = a(1-r)^t$

$100 = 1000(1-.06)^t$

$.1 = .94^t$

$\log .1 = \log .94^t$

$\log .1 = t \log .94$

$\frac{\log .1}{\log .94} = t$

$37.21 = t$ 2015

3. $y = P\left(1+\frac{r}{n}\right)^{nt}$

$1133 = 1000\left(1+\frac{.025}{12}\right)^{(12 \cdot t)}$

$1.133 = 1.002083333^{12t}$

$\log 1.133 = \log 1.002083333^{12t}$

$\log 1.133 = 12t \log 1.002083333$

$5 = t$

4. $A = Pe^{rt}$

$2080 = 700e^{.06t}$

$2.8571 = e^{.06t}$

$\ln 2.8571 = \ln e^{.06t}$

$\ln 2.8571 = .06t$

$\frac{\ln 2.8571}{.06} = t$

$17.5 = t$

At least 18 yrs

5. $y = ae^{-kt}$

$5000 = 8000e^{(-.058)(t)}$

$.625 = e^{-.058t}$

$\ln .625 = \ln e^{-.058t}$

$\ln .625 = -.058t$

$8.1 = t$

so 2018

Level 4 problems:

1. $A = a(1-r)^t$

$13,861.34 = 17,000(1-r)^5$

$\sqrt[5]{.815373} = \sqrt[5]{(1-r)^5}$

$.96 = 1-r$

$r = .04$

4%.

2. $A = a(1+r)^t$

$191,000 = 120,000(1+r)^{10}$

$\sqrt[10]{1.5917} = \sqrt[10]{(1+r)^{10}}$

$1.04758 = 1+r$

$.0475 = r$

4.75%.

4.8% (rounded to nearest tenth)

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

$\frac{1038.65}{600} = \frac{600\left(1+\frac{r}{12}\right)^{(12\cdot 10)}}{600}$

$1.7311 = \left(1+\frac{r}{12}\right)^{120}$

$1.004583 = 1+\frac{r}{12}$

$.004583 = \frac{r}{12}$

$.055 = r$

5.5%.

4. $y = ae^{-kt}$

$\frac{\frac{1}{2}a}{a} = \frac{ae^{-k(5760)}}{a}$

$\frac{1}{2} = e^{-5760k}$

$\ln \frac{1}{2} = \ln e^{-5760k}$

$\ln \frac{1}{2} = -5760k$

$.00012 = k$