Logarithm Modeling

Annual % increase/decrease: $y = a(1 \pm r)^t$ Interest compounded continuously: $A = Pe^{rt}$

1) The value of a $15,000 car depreciates 12% each year. Find the value of the car after 4 years.

$Y = 15000(1-.12)^4$

$Y = \$8,995.43$

2) How long until the car in #1 is worth $7,236? (round to the tenth)

$\frac{7236}{15000} = \frac{15000(1-.12)^t}{15000}$

$0.4824 = (0.88)^t$

$\log_{0.88} 0.4824 = t$

$5.7 \text{ yrs} = t$

3) The tuition for a local university has increased 3% each year. The current tuition is $12,500. At this rate, in how many years will the tuition be $15,000? (round to the tenth)

$\frac{15000}{12500} = \frac{12500(1+.03)^t}{12500}$

$1.2 = (1.03)^t$

$\log_{1.03} 1.2 = t$

$6.2 \text{ yrs} = t$

4) How much will the tuition in #3 be in 10 years?

$Y = 12500(1+.03)^{10}$

$Y = \$16,798.95$

5) If you invest $10,000 at 6% interest compounded continuously, what will be the amount the investment has grown to after 3 years?

$A = Pe^{rt}$

$A = 10000e^{.06(3)}$

$A = \$11,972.17$

6) How long until the money in #5 is worth $16,450?

$\frac{16450}{10000} = \frac{10000e^{.06t}}{10000}$

$1.645 = e^{.06t}$

$\ln 1.645 = .06t$

$0.4977 = .06t$

$8.3 \text{ yrs} = t$

7) If you invest $4,000 at 3.5% interest compounded continuously, how long until you have $5,000?

$\frac{5000}{4000} = \frac{4000e^{.035t}}{4000}$

$1.25 = e^{.035t}$

$\ln 1.25 = .035t$

$0.2231 = .035t$

$6.4 \text{ yrs} = t$

8) How much money will you have after 10 years from #7?

$Y = 4000e^{.035(10)}$

$Y = \$5676.27$

Scanned with CamScanner