Section 5.6: Applications

Thursday, February 12, 2015
12:03 PM

we'll look at 4 different applications:

compound interest:

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

compounding over n periods per year

$$A = Pe^{rt}$$

compounding continuously

exponential growth

$$A = A_0 e^{rt}$$

exponential decay

$$A = A_0 e^{-rt} \quad (\text{with } r > 0)$$

Newton's Law of Cooling

Alanna invests a certain amount at 4% per year, compounded monthly. How long will it take for her investment to double in value?

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

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

$$\frac{2P}{P} = \frac{P}{P}\left(1 + \frac{0.04}{12}\right)^{12t}$$

$$2 = \left(1.00\overline{3}\right)^{12t}$$

$$\ln 2 = \ln\left(1.00\overline{3}\right)^{12t}$$

$$\ln 2 = 12t \ln\left(1.00\overline{3}\right)$$

$$t = \frac{\ln 2}{12 \ln\left(1.00\overline{3}\right)}$$

$$= 17.3575$$

$$= 17 \text{ years}$$