Section 5.5 Applications of Exponential and Logarithmic Functions

Objective 1: Solving Compound Interest Applications

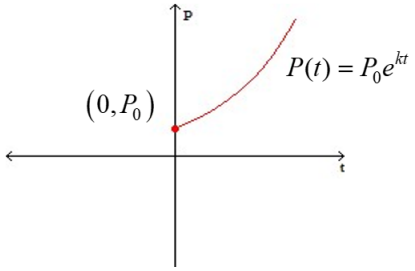
The **Periodic Compound Interest Formula** is $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where *A* is the total amount in the account after *t* years, *P* is the principal (original investment amount), *r* is the annual interest rate as a decimal, and *n* is the number of times interest is compounded per year.

The **Continuous Compound Interest Formula** is $A = Pe^{rt}$, where *A* is the total amount in the account after *t* years, *P* is the principal (original investment amount), and *r* is the annual interest rate as a decimal.

Objective 2: Exponential Growth and Decay Applications

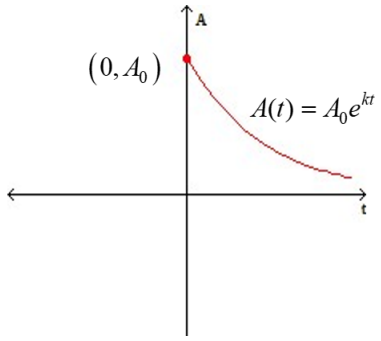
Exponential Growth

A model that describes the population, *P*, after a certain time, *t,* is $P(t) = P_0 e^{kt}$ where $P_0 = P(0)$ is the initial population and $k > 0$ is a constant called the **relative growth rate**. (Note: *k* may be given as a percent.)



Exponential Decay

A model that describes the exponential decay of a population, quantity or amount *A*, after a certain time, *t,* is $A(t) = A_0 e^{kt}$ where $A_0 = A(0)$ is the initial quantity and $k < 0$ is a constant called the **relative decay constant**. (Note: *k* is sometimes given as a percent.)



Half-Life: Every radioactive element has a half-life, which is the required time for a given quantity of that element to decay to half of its original mass.