Exponential Growth

Example

A population of 10,000 people grew exponentially to 15,000 in 5 years. (Leave your answers in logarithmic form.)

1. Write an exponential equation for the population as a function of time.

2. At this rate, how long will it take for the population to reach 50,000?

Exponential Decay

Example

A drug injected into the bloodstream is found to metabolize in such a way that the amount $Q(t)$ remaining in the bloodstream after t hours is given by an exponential function of t. Assume that 30 mg is injected at time $t = 0$ and that, after 2 hours, the amount remaining is 5 mg.

1. Find $Q(t)$. (You may use logarithmic expressions in your answer.)

2. How long will it take for the amount of drug remaining in the bloodstream to be 1 mg?

Effective Rate

Example

Find the effective rate corresponding to each stated rate.

(a) 5% compounded quarterly

(b) 5% compounded continuously

Limited Growth Functions

Example

On average, the percentage score of your midterm is a function of how much time you spend studying every week.
Albert the psychologist has decided that your midterm percentage P (out of 100), and the number of hours a week you spend studying t, are related by the function

$$P = 100 - 100e^{-t/3}.$$

(a) What happens to the percentage P as the time t increases?

(b) How many hours a week should you study if you want 75% on your midterm? (You may leave your answer in logarithmic form.)