

Section 5.5 Exponential and Logarithmic Models

Objective: In this lesson you learned how to use exponential growth models, exponential decay models, Gaussian models, logistic growth models, and logarithmic models to solve real-life problems.

Course Number

Instructor

Date

Important Vocabulary

Define each term or concept.

Bell-shaped curve

Logistic curve

Sigmoidal curve

I. Introduction (Page 384)

The **exponential growth model** is _____.

The **exponential decay model** is _____.

The **Gaussian model** is _____.

The **logistic growth model** is _____.

Logarithmic models are _____ and

_____.

What you should learn

How to recognize the five most common types of models involving exponential and logarithmic functions

II. Exponential Growth and Decay (Pages 385–387)

Example 1: Suppose a population is growing according to the model $P = 800e^{0.05t}$, where t is given in years.

- What is the initial size of the population?
- How long will it take this population to double?

What you should learn

How to use exponential growth and decay functions to model and solve real-life problems

To estimate the age of dead organic matter, scientists use the carbon dating model _____, which denotes the ratio R of carbon 14 to carbon 12 present at any time t (in years).

Example 2: The ratio of carbon 14 to carbon 12 in a fossil is $R = 10^{-16}$. Find the age of the fossil.

III. Gaussian Models (Page 388)

The Gaussian model is commonly used in probability and statistics to represent populations that are _____

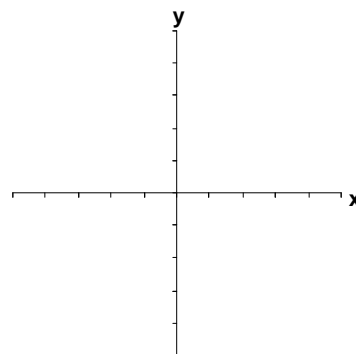
_____.

For a Gaussian model, the average value for a population can be found . . .

Example 3: Draw the basic form of the graph of a Gaussian model.

What you should learn

How to use Gaussian functions to model and solve real-life problems

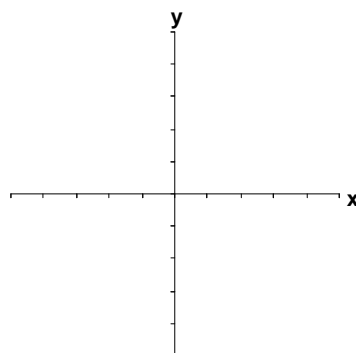
**IV. Logistic Growth Models** (Page 389)

Give an example of a real-life situation that is modeled by a logistic growth model.

Example 4: Draw the basic form of the graph of a logistic growth model.

What you should learn

How to use logistic growth functions to model and solve real-life problems

**V. Logarithmic Models** (Page 390)

Example 5: The number of kitchen widgets y (in millions) demanded each year is given by the model $y = 2 + 3 \ln(x + 1)$, where $x = 0$ represents the year 2000 and $x \geq 0$. Find the year in which the number of kitchen widgets demanded will be 8.6 million.

What you should learn

How to use logarithmic functions to model and solve real-life problems

Homework Assignment

Page(s)

Exercises