

Chapter 10 Analytic Geometry in Three Dimensions

Course Number

Instructor

Date

Section 10.1 The Three-Dimensional Coordinate System

Objective: In this lesson you learned how to plot points, find distances between points, and find midpoints of line segments connecting points in space and how to write equations of spheres and graph traces of surfaces in space.

Important Vocabulary

Define each term or concept.

Solid analytic geometry

Sphere

Surface in space

Trace

I. The Three-Dimensional Coordinate System

(Pages 742–743)

A **three-dimensional coordinate system** is constructed by . . .

What you should learn

How to plot points in the three-dimensional coordinate system

Taken as pairs, the axes determine three **coordinate planes**: the _____, the _____, and the _____.

These three coordinate planes separate the three-dimensional coordinate system into eight _____. The first octant is the one in which . . .

In the three-dimensional system, a point P in space is determined by an ordered triple (x, y, z) , where x , y , and z are as follows . . .

II. The Distance and Midpoint Formulas (Pages 743–744)

The distance between the points (x_1, y_1, z_1) and (x_2, y_2, z_2) given by the **Distance Formula in Space** is

$$d = \sqrt{\hspace{15em}}$$

The midpoint of the line segment joining the points (x_1, y_1, z_1) and (x_2, y_2, z_2) given by the **Midpoint Formula in Space** is

$$\left(\hspace{15em} \right)$$

Example 1: For the points $(2, 0, -4)$ and $(-1, 4, 6)$, find
 (a) the distance between the two points, and
 (b) the midpoint of the line segment joining them.

III. The Equation of a Sphere (Pages 744–746)

The standard equation of a sphere whose center is (h, k, j) and whose radius is r is _____.

Example 2: Find the center and radius of the sphere whose equation is $x^2 + y^2 + z^2 - 4x + 2y + 8z + 17 = 0$.

To find the yz -trace of a surface, . . .

What you should learn
 How to find distances between points in space and find midpoints of line segments joining points in space

What you should learn
 How to write equations of spheres in standard form and find traces of surfaces in space

Homework Assignment

Page(s)

Exercises