Planes and Surfaces

Read Lesson 9 in the study guide

Read Section 12.1 in the text

Try 11, 13, 15, 17, 19, 23, 25, 29, 33, 37, 41, 45, 49, 53, 57 3

Equation of a Plane

The *standard form* for the equation of a plane through $P_1(x_1, y_1, z_1)$ perpendicular to $\mathbf{n} = \langle A, B, C \rangle$ is

$$A(x - x_1) + B(y - y_1) + C(z - z_1) = 0$$

or

$$\langle A, B, C \rangle \cdot \langle x - x_1, y - y_1, z - z_1 \rangle = 0$$

or

$$Ax + By + Cz = Ax_1 + By_1 + Cz_1$$

Computations Involving Planes

- Finding equations of planes
- Finding angles between planes
- Distance from a point to a plane

$$\frac{Ax_0 + By_0 + Cz_0 - D}{\sqrt{A^2 + B^2 + C^2}}$$

- Distance between parallel planes

Cylinders, Trace

DEFINITION Cylinder

Given a curve C in a plane P and a line l not in P, a **cylinder** is the surface consisting of all lines parallel to l that pass through C

DEFINITION Trace

A **trace** of a surface is the set of points at which the surface intersects a plane that is parallel to one of the coordinate planes. The traces in the coordinate planes are called the ***xy*-trace**, the ***xz*-trace**, and the ***yz*-trace** (Figure 12.10).

See examples in the text of quadric surfaces.