Lines and Coordinate Geometry Proofs

Objectives

1. Identify the slope and y-intercept of the line specified by a given equation.
2. Draw the graph of the line specified by a given equation.
3. Write an equation of a line when given either one point and the slope of the line, or two points on the line.
4. Determine the intersection of two lines.
5. Given a polygon, choose a convenient placement of coordinate axes and assign appropriate coordinates.
6. Prove statements by using coordinate geometry methods.

13-6 *Graphing Linear Equations*

A **linear equation** is an equation whose graph is a line. As you will learn in this section and the next, linear equations can be written in different forms: *standard form*, *slope-intercept form*, and *point-slope form*. We state a theorem for the standard form, but omit the proof.

Theorem 13-6 *Standard Form*

The graph of any equation that can be written in the form

$$Ax + By = C$$

where A and B are not both zero, is a line.

The advantage of the standard form is that it is easy to determine the points where the line crosses the x-axis and the y-axis. If a line intersects the x-axis at the point $(a, 0)$, then its *x-intercept* is a; if it intersects the y-axis at the point $(0, b)$, then its *y-intercept* is b.

Example 1   Graph the line $2x - 3y = 12$.

Solution   Since two points determine a line, begin by plotting two convenient points, such as the points where the line crosses the axes. Then draw the line through the points.