1. Let \((x_1, y_1)\) and \((x_2, y_2)\) be two different points on a nonvertical line. The slope of the line is

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{ (vertical change \over horizontal change)}
\]

2. A vertical line has no slope, because any two points on it must have \(x_1 = x_2\), which gives a denominator of zero in the slope equation. For a horizontal line, any two points must have \(y_1 = y_2\), which gives a numerator of zero in the slope equation, and hence the slope of the horizontal line is zero.

3. We can characterize the orientation of a line by its slope:

- Zero slope: horizontal line
- Undefined slope: vertical line
- Positive slope: line rises from left to right
- Negative slope: line falls from left to right

4. The closer the slope is to 0, the more nearly horizontal is the line.

5. The greater the absolute value of the slope, the more nearly vertical is the line.

6. Two lines are parallel if and only if they have the same slope or are both vertical.

7. Two lines with nonzero slopes \(m_1\) and \(m_2\) are perpendicular to each other if and only if \(m_1 \cdot m_2 = -1\).

8. Forms of Equations of Straight Lines

- Point-slope form: \(y - y_1 = m(x - x_1)\)
- Slope-intercept form: \(y = mx + b\)
- General linear form: \(Ax + By + C = 0\)
  - Vertical line: \(x = a\)
  - Horizontal line: \(y = b\)
(a) Find a general linear equation of the straight line that passes through \((-6, 1)\) and \((1, 4)\).

(b) Find a general linear equation of the straight line that is horizontal and passes through \((-5, -3)\).

(c) Find an equation of the line that passes through \((1, 1)\) and is parallel to \(y = -\frac{3}{4}x - 2\).

(d) Find an equation of the straight line that is perpendicular to \(y = 3x - 5\) and passes through \((3, 4)\).

(e) A straight line has slope 3 and \(y\)-intercept \((0, 1)\). Does the point \((-1, -2)\) lie on the line?

(f) (Revenue Equation) A small business predicts its revenue growth by a straight-line method with a slope of \(50,000\) per year. In its fifth year, it had revenue of \(330,000\). Find an equation that describes the relationship between revenues, \(R\), and the number of years, \(T\), since it opened for business.

Assignment: Do Problems 3.1: 4, 12, 14, 18, 22, 26, 30, 38, 56.