

Section 1.3

The slope-intercept form of the equation of a line: The graph of the equation

$$y = mx + b$$

is a line whose slope is m and whose y -intercept is $(0, b)$.

The slope of a line passing through two points: The slope m of a nonvertical line through (x_1, y_1) and (x_2, y_2) is

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

where $x_1 \neq x_2$.

Point-slope form of the equation of a line: The equation of the line with slope m passing through the point (x_1, y_1) is

$$y - y_1 = m(x - x_1).$$

Parallel and Perpendicular lines

- Two distinct nonvertical lines are parallel if and only if their slopes are equal, that is, $m_1 = m_2$.
- Two nonvertical lines are perpendicular if and only if their slopes are negative reciprocals of each other, that is, $m_1 = -1/m_2$.

Summary of equations of lines

- General form: $Ax + By + C = 0$
- Vertical line: $x = a$
- Horizontal line: $y = b$
- Two-point form: $y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$

Problems

Problem 1. Find the slope and y -intercept of the equation of the line. Sketch the line.

- $y = x - 4$

b) $x - 3 = 0$

c) $y + 4 = 0$

d) $2x + 5y = 8$

Problem 2. Find the slope of the line passing through the pair of points.

a) $(2, 4), (4, -4)$

b) $(0, -10), (-4, 0)$

Problem 3. Find the slope-intercept form of the equation of the line passing through the points.

a) $(4, 3), (-4, -4)$

b) $(1, 1), (6, -\frac{2}{3})$

Problem 4. Write the slope-intercept forms of the equations of the lines through the given point (a) parallel to the given line and (b) perpendicular to the given line.

a) $(-3, 2), x + y = 7$

b) $(4, -2), y = 1$

c) $(-5, 1), x = -2$

Problem 5. You are driving on a road that has a 6% uphill grade. This means that the slope of the road is $6/100$. Approximate the amount of vertical change in your position if you drive 200 feet.

Problem 6. A school district purchases a high volume printer, copier, and scanner for \$25,000. After 10 years, the equipment will have to be replaced. Its value at that time is expected to be \$2000. Write a linear equation giving the value V of the equipment during the 10 years it will be in use.

Homework: Read section 1.3, do #11, 17, 23, 27, 39, 49, 51, 59, 69, 75, 95, 97 (the quiz for this section will be similar to these problems)