Math 1324
Section 1.1
Linear Equations: Slope and Equations of Lines

The videos corresponding to this worksheet can be found at
https://online.math.uh.edu/Math1324/.
UH students can alternatively view the videos within the Math 1324 textbook.

Slope of a Line

Let (x_1, y_1) and (x_2, y_2) be two arbitrary points on the two dimensional plane. The slope of the line that passes through these two points, denoted by *m*, is given by

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

provided that $x_2 - x_1 \neq 0$.

Example 1: Find the slope of the line that passes through (-2, -2) and (4, -4).

Example 2: Find the slope of the line that passes through (2, 3) and (2, -2).

Example 3: Find the slope of the line that passes through $\left(\frac{-6}{11}, 0\right)$ and $\left(\frac{1}{5}, 0\right)$.

Example 4: Find the slope of the line that passes through (-1, 10) and (-3, -10).

Equations of Lines

Point-Slope Form: $y - y_1 = m(x - x_1)$, where m is the slope and (x_1, y_1) is a point on the line.

Slope-Intercept Form: $y = mx + b$, where m is the slope and b is the y-intercept of the line.

Standard Form: $Ax + By = C$, where A, B, and C are real numbers and A and B cannot both be equal to zero.

General Form: $Ax + By + C = 0$, where A, B, and C are real numbers and A and B cannot both be equal to zero.

Example 5: Given $-3x + 4y = -16$, find the slope and y-intercept.

Example 6: Write an equation of the line that has slope -2 and y-intercept -1/4.

Example 7: Write an equation of the line that has slope 2 and passes through (5, 8).

Example 8: Write an equation of the line that has slope $-\frac{3}{8}$ and passes through (-1, -6).

Example 9: Write an equation of the line that passes through (-3, 1) and (-1, -7).

Example 10: Write an equation of the line that passes through (0, -8) and (5, 0).

Parallel and Perpendicular Lines

Two nonvertical lines are **parallel** if and only if their slopes are the same. m_1 m_2

Two lines are **perpendicular** if and only if their slopes are negative reciprocals of each other.

Example 11: Write an equation of the line that passes through (-2, 7) and is perpendicular to $y = -5x - 10$.

Example 12: Write an equation of the line that passes through (1, 2) and is parallel to $-10x + 5y = -10$.

Example 13: Write an equation of the line that passes through (10, 15) and is perpendicular to the line that passes through (0, 4) and (-6, -2).

Example 14: Write an equation of the line that passes through (0, 2) and is parallel to the line that passes through (-5, 2) and (3, 8).