Math122 College Algebra

Professor Douglas J. Ryan

2.4
Lines

- If a line is horizontal, its slope is $m = 0$ and its equation is $y = b$ where b is the y-intercept
- An equation of the horizontal line through (a, b) $is\ y = b$
- If a line is vertical, there is no slope and its equation is $x = a$ where a is the x-intercept
- An equation of the vertical line through (a, b) $is\ x = a$

Problem

1. Find the equation of the horizontal line through (5,1)

2. Sketch the graph

3. Determine any intercepts

General Equation of a Line

- A linear equation is an equation of the form $Ax + By + C = 0$ $where$ $A, B, and\ C$ are constants and A and B are not both 0

- Every equation of a line can be put in this form

- Example: A nonvertical line has the equation $y = mx + b$ or $-mx + y - b = 0$ $where$ $A = -m, B = 1, and\ C = -b$

Problem

1. Sketch the graph of $2y - x - 1 = 0$

2. What is the slope of the line?

3. Determine the x- and y-intercepts of the line.

Parallel Lines

- Two nonvertical lines are parallel if and only if they have the same slope

- Problem: Find an equation of the line passing through point (2,2) that is parallel to the line $y - 2x - 5 = 0$

Perpendicular Lines

- Two lines with slopes $m1 \; and \; m2$ are perpendicular if and only if $m1m2 = -1$ (i.e. their slopes are negative reciprocals $m2 = -\dfrac{1}{m1}$ or $m1 = -\dfrac{1}{m2}$

- Also, a horizontal line with slope 0 is perpendicular to a vertical line with no slope

Problem

- Determine whether the points a (-1,2); b (4,-3); c (1,3) form a right triangle. How many ways can you do this?

Problem

- Find the equation of a line that is perpendicular to $4x + 6y + 5 = 0$