150 Lecture Notes for Section 1.10

Lines

Slope = \[ \frac{\text{change in } y\text{'s}}{\text{change in } x\text{'s}} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} \]

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]

Note: The slope of a vertical line is undefined.

Given any two points, find the slope between them.

Given: \( P = (4, -3), Q = (6, 5) \), find \( m_{PQ} \)

Given: \( A = (-1, 2), B = (3, -4) \), find \( m_{AB} \)

Point Slope Form of a Line: \( y - y_1 = m(x - x_1) \)

The equation of the line through \( PQ \) is:

Slope-intercept form of the equation: \( y = mx + b \)

- a) Find the slope and y-intercept of \( x + 3y = 5 \)

- b) Find the equation of the line whose y-intercept is \(-2\), with a slope of 3.

General Equation of a Line: \( Ax + By + C = 0 \), \((A, B \text{ not both zero})\)

Graph: \( 2x + 3y - 12 = 0 \)
Two non-vertical lines are **PARALLEL** iff they have the same slope.

Find the equation of the line through \((8, -2)\) parallel to \(4x - 2y + 6 = 0\)

Two non-vertical lines are **PERPENDICULAR** iff the product of their slopes is -1.

Show PQR are the vertices of a right triangle when \(P = (3, 3), Q = (8, 17), R = (11, 5)\).

Find the equation of a line passing through \((5, -3)\) perpendicular to the line \(2x + 3y = 12\).

Suppose a small business buys a fax machine for $120. In three years it’s value is $45. Assuming a linear depreciation, find an equation which expresses the value \(V\) of the fax machine at any time \(t\). Let \(t\) = the age of the machine in years, \(V\) = value in dollars

What is the life expectancy of this fax machine?