Unit 3.5

Equations of Lines

Need: Point & Slope

Point-Slope Form

\[ y - y_1 = m(x - x_1) \]

Slope-Intercept Form

\[ y = mx + b \]

(Solve for \( y \))

Example 1

Write the equation of the line through (-3, 5) that is perpendicular to the line \( 3x + 5y = 15 \). Write your answer in both standard & slope-intercept form.

Point: \((-3, 5)\) to need Slope: \(3x + 5y = 15\)

\[ 5y = -3x + 15 \]

\[ y = -\frac{3}{5}x + 3 \]

\[ L \to -\frac{3}{5} = \frac{5}{3} \]
Slope-intercept $(y = mx + b)$

$m = \frac{5}{3}$

$y - 5 = \frac{5}{3} (x + 3)$

$y = \frac{5}{3} x + 5$

$y = \frac{5}{3} x + 10$

Traditional Standard form $ax + by = c$

$3(y - 5) = \frac{5}{3} (x + 3)$

$3y - 15 = \frac{5}{3} x + 15$

$-5x + 3y = 15 + 15$

We can live the side

$5x - 3y = -30$
Proportion

Slope-intercept

\[ y = mx + b \]

\((-3, 5)\) \[ m = \frac{y_2 - y_1}{x_2 - x_1} \]

\[ m = \frac{5}{3} \]

\[ \frac{5}{3} = \frac{y - 5}{x + 3} \]

\[ 3(y - 5) = 5(x + 3) \]
\[ 3y - 15 = 5x + 15 \]
\[ +15 \]
\[ 3y = 5x + 30 \]

\[ y = \frac{5}{3}x + 10 \]

Proportion

Standard \[ ax + by = c \]

\[ \frac{5}{3} = \frac{y - 5}{x - 3} \]

\[ 5(x + 3) = 3(y - 5) \]
\[ 5x + 15 = 3y - 15 \]
\[ 5x - 3y = -30 \]