

Example 1. Find the slope-intercept equation of the line that passes through the points $(-4, -1)$ and $(3, -3)$.

Solution. The slope of the line is

$$\begin{aligned}m &= \frac{y_2 - y_1}{x_2 - x_1} \\&= \frac{-3 - (-1)}{3 - (-4)} \\&= \frac{-3 + 1}{3 + 4} \\&= \frac{-2}{7} \\&= -\frac{2}{7}\end{aligned}$$

If we use the point $(-4, -1)$ for (x_0, y_0) in the point-slope equation $y - y_0 = m(x - x_0)$ we obtain

$$\begin{aligned}y - (-1) &= -\frac{2}{7}[x - (-4)] \\y + 1 &= -\frac{2}{7}(x + 4)\end{aligned}$$

Solving for the slope-intercept equation $y = mx + b$ yields

$$\begin{aligned}y &= -\frac{2}{7}(x + 4) - 1 \\y &= -\frac{2}{7}x - \frac{8}{7} - 1 \\y &= -\frac{2}{7}x - \frac{8}{7} - \frac{7}{7} \\y &= -\frac{2}{7}x - \frac{15}{7}\end{aligned}$$