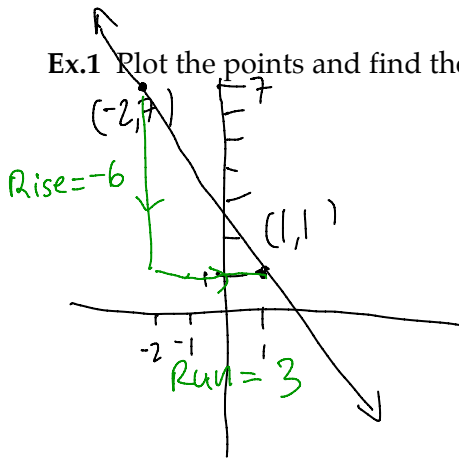


Section P.2 Linear Models and Rates of Change

Ex.1 Plot the points and find the slope: (1,1) and (-2,7)



$$m = \frac{\text{Rise}}{\text{Run}} = \frac{-6}{3}$$

$$m = -2 \quad \checkmark$$

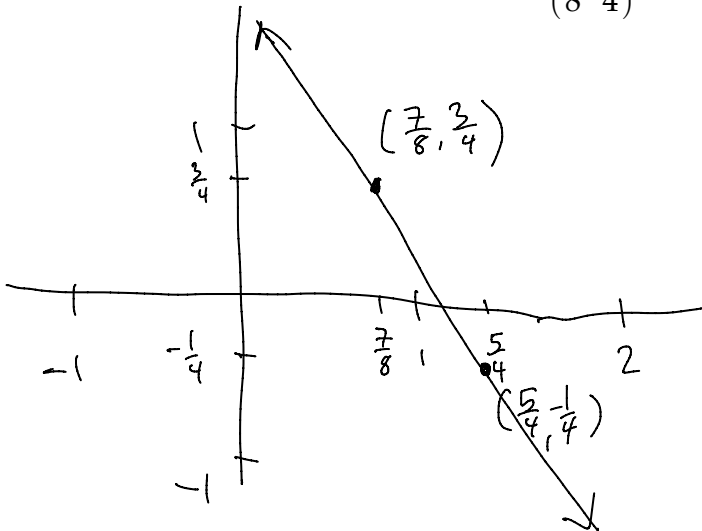
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{(1) - (7)}{(1) - (-2)}$$

$$m = \frac{-6}{3}$$

$$m = -2$$

Ex.2 Plot the points and find the slope: $(\frac{7}{8}, \frac{3}{4})$ and $(\frac{5}{4}, -\frac{1}{4})$



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

$$m = \frac{(-\frac{1}{4}) - (\frac{3}{4})}{(\frac{5}{4}) - (\frac{7}{8})}$$

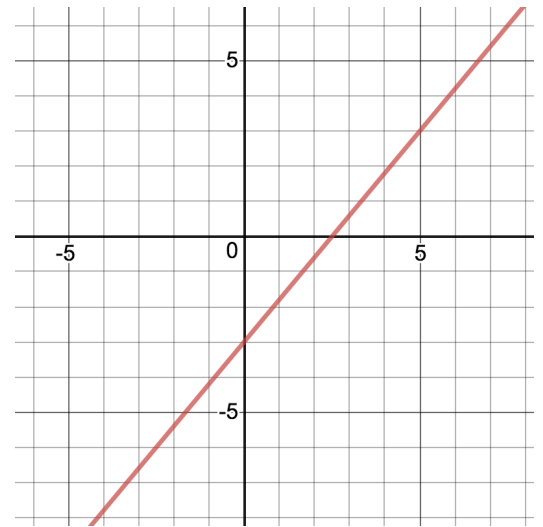
$$m = \left[\begin{array}{cc} -\frac{1}{4} & -\frac{3}{4} \\ \frac{5}{4} & -\frac{7}{8} \end{array} \right] \left(\frac{\frac{8}{1}}{\frac{8}{1}} \right)$$

$$m = \frac{-2 \quad -6}{10 \quad -7}$$

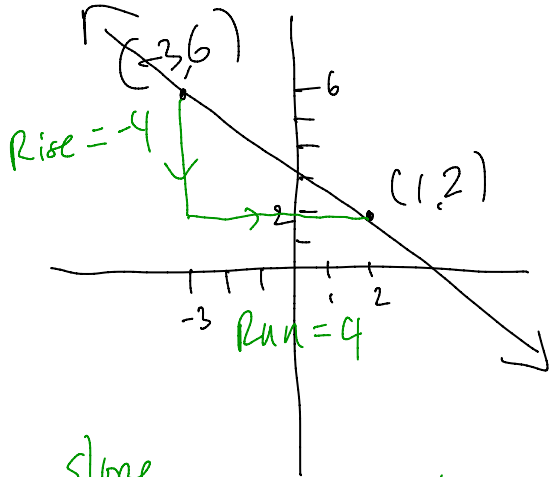
$$m = \frac{-8}{3} \quad \checkmark$$

Ex.3 Find the slope and the y-intercept: $6x - 5y = 15$

$$\begin{aligned}
 -6x + 6x - 5y &= 15 - 6x \\
 -5y &= -6x + 15 \\
 -\frac{1}{5}(-5y) &= -\frac{1}{5}(-6x + 15) \\
 y &= \frac{6}{5}x - 3 \\
 \text{slope } m &= \frac{6}{5} \quad \left| \begin{array}{l} \text{y-intercept} \\ (0, b) = (0, -3) \end{array} \right.
 \end{aligned}$$

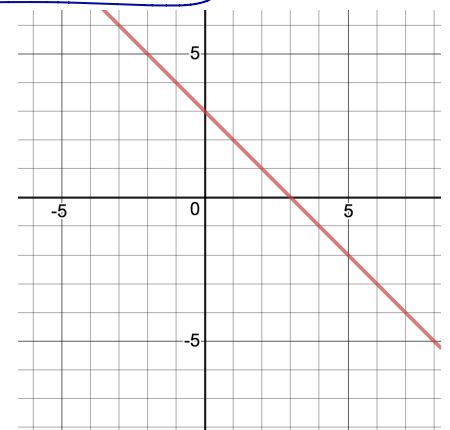


Ex.4 Find an equation of the line passing through the two points: $(-3, 6)$ and $(1, 2)$



$$\begin{aligned}
 \text{slope } m &= \frac{\text{Rise}}{\text{Run}} = \frac{-4}{4} \\
 m &= -1
 \end{aligned}$$

$$\begin{aligned}
 y - y_1 &= m(x - x_1) \\
 y - (-3) &= (-1)[x - (6)] \\
 y + 3 &= -x + 6 \\
 y + 3 - 3 &= -x + 6 - 3 \\
 \boxed{y} &= \boxed{-x + 3}
 \end{aligned}$$



Ex.5 Find an equation of the line passing through the point $(4, -5)$, and perpendicular to

$$3x + 4y = 7.$$

$$\begin{aligned} 3x + 4y &= 7 \\ 4y &= -3x + 7 \\ \frac{1}{4} \cdot 4y &= \frac{1}{4}(-3x + 7) \\ y &= -\frac{3}{4}x + \frac{7}{4} \end{aligned}$$

$$m = -\frac{3}{4} \quad m_{\perp} = \frac{4}{3}$$
$$(0, b) = (0, \frac{7}{4})$$

$$\begin{aligned} y - y_1 &= m_{\perp}(x - x_1) \\ y - (-5) &= \left(\frac{4}{3}\right)[x - (4)] \\ y + 5 &= \frac{4}{3}x - \frac{16}{3} \\ y + 5 - 5 &= \frac{4}{3}x - \frac{16}{3} - \frac{15}{3} \end{aligned}$$

$$y = \frac{4}{3}x - \frac{31}{3}$$

