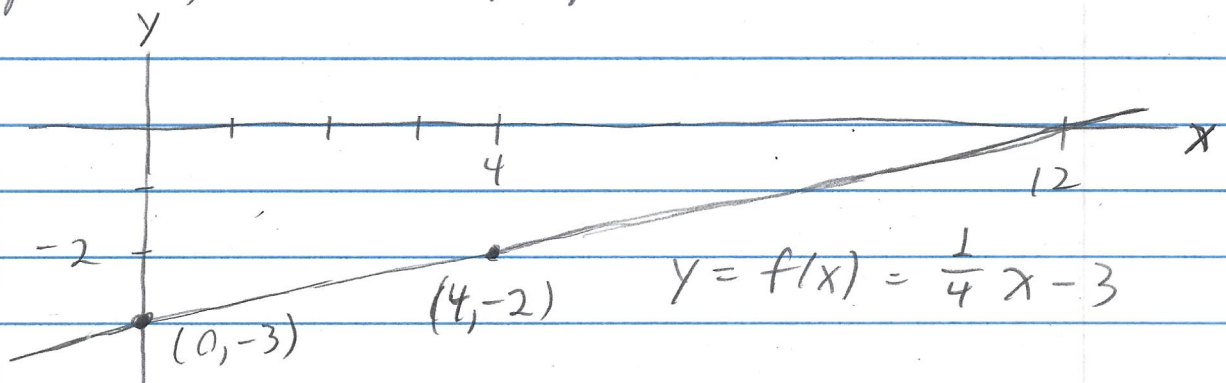


Exercise 3.1.17 Consider the linear function  $f(x) = \frac{1}{4}x - 3$ . (a) Find the slope and  $y$ -intercept. (b) Use the slope and  $y$ -intercept to graph function  $f$ . (c) What is the average rate of change of  $f$ ? (d) Determine whether  $f$  is increasing, decreasing, or constant.

Solution

(a) Since  $f(x)$  is in the form  $mx + b$  with  $m = 1/4$  and  $b = -3$ , then the slope is  $m = 1/4$  and the  $y$ -intercept is  $-3$  (or the point  $(0, -3)$ ).

(b) The slope is  $m = \Delta y / \Delta x = 1/4$ , so we take  $\Delta x = 4$  and  $\Delta y = 1$  to get a new point on the graph based on the  $y$ -intercept  $(x, y) = (0, -3)$ . The new point is  $(x + \Delta x, y + \Delta y) = ((0) + (4), (-3) + (1)) = (4, -2)$ . With two points, we can graph  $f$ :



(c) The average of change of a linear function is its slope (by Theorem 3.1.A), and so is  $1/4$ .

(d) Since  $m = 1/4 > 0$  then by Theorem 3.1.B,  $f$  is increasing.  $\square$