

## Section 1.3

### Linear Functions and Models

$$y = mx + b$$

$m$  = slope

$b$  =  $y$ -intercept

$$(2, 3) \quad (8, 7)$$

write the equation of the line through points

point

slope

Form

$$y - y_1 = m(x - x_1)$$

or

$$m = \frac{y - y_1}{x - x_1}$$

$$(8, 7)$$

$$(2, 3)$$

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

$$= \frac{7 - 3}{8 - 2} = \frac{4}{6} = \frac{2}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = \frac{2}{3}(x - 2)$$

$$y = \frac{2}{3}x - \frac{4}{3} + 3$$

$$y = \frac{2}{3}x - \frac{4}{3} + \frac{9}{3}$$

$$y = \frac{2}{3}x + \frac{5}{3}$$

$$m = \frac{y - y_1}{x - x_1}$$

$$(2, 3)$$

$$\frac{2}{3} = \frac{y - 3}{x - 2}$$

goal  $y = mx + b$

$$3(y - 3) = 2(x - 2)$$

$$3y - 9 = 2x - 4$$

$$3y = 2x + 5$$

$$y = \frac{2}{3}x + \frac{5}{3}$$

1.3

(4)

|      |    |    |                 |
|------|----|----|-----------------|
| X    | 2  | 4  | 5               |
| f(x) | -1 | -2 | $-2\frac{1}{2}$ |

$\widehat{+2}$  (above 2 to 4)  
 $\underbrace{-1}$  (below -1 to -2)

$$m = \frac{-1}{2} \quad \frac{y}{x}$$

(10)

|   |      |   |   |   |    |
|---|------|---|---|---|----|
| 0 | X    | 1 | 2 | 3 | 4  |
| 2 | f(x) | 4 | 6 | 8 | 10 |

$\widehat{+1}$  (above 1 to 2)  
 $\underbrace{+2}$  (below 4 to 6)

(0, 2)  $y = mx + b$

$$m = \frac{2}{1} = 2$$

$y = 2x + 2$

(14)

|      |               |   |   |   |    |    |
|------|---------------|---|---|---|----|----|
| X    | $\frac{4}{3}$ | 0 | 3 | 5 | 6  | 9  |
| f(x) |               | 2 | 6 | 9 | 12 | 15 |
| g(x) |               |   |   |   |    |    |

$\widehat{+3}$  (above 0 to 3),  $\widehat{+2}$  (above 3 to 5),  $\widehat{+1}$  (above 5 to 6),  $\widehat{+3}$  (above 6 to 9)  
 $\underbrace{+4}$  (below 2 to 6),  $\underbrace{+3}$  (below 6 to 9)

|      |    |   |    |    |    |
|------|----|---|----|----|----|
| g(x) | -1 | 8 | 14 | 17 | 26 |
|      |    |   |    |    |    |

$\underbrace{9}$  (below -1 to 8),  $\underbrace{+6}$  (below 8 to 14),  $\underbrace{+3}$  (below 14 to 17),  $\underbrace{+9}$  (below 17 to 26)

$$\frac{9}{3} = 3 \quad \frac{6}{2} = 3 \quad \frac{9}{3} = 3$$

$$m = 3$$

(0, -1)

$y = 3x - 1$

78 If it costs Microsoft \$4,500 to produce 8 Xboxes & \$8,900 to produce 16, obtain the corresponding linear cost function. What is the cost to manufacture each additional Xbox?

Use the cost function to estimate the cost to manufacture 50 Xboxes.

$$(x, y) \rightarrow (p, q)$$

or

$$\rightarrow (q, p)$$

$$\begin{matrix} (45 * (8, 4500)) \\ (16, 8900) \end{matrix} \quad m = \frac{4500 - 8900}{8 - 16}$$

$$\frac{-4400}{-8} = 550$$

$$y - y_1 = m(x - x_1)$$

$$p - p_1 = m(q - q_1)$$

$$p - 4500 = 550(q - 8)$$

$$p = 550q - 4400 + 4500$$

$$p = \underline{550q + 100} \quad \text{cost function}$$

$$p = 550(50) + 100$$

$$p = \$27,600$$