

Name \_\_\_\_\_

SHOW AS MUCH WORK AS POSSIBLE BECAUSE YOU MAY RECEIVE PARTIAL CREDIT FOR THE WORK YOU DO IF YOUR ANSWER IS INCORRECT.

1. A company's profit increased linearly from \$4 million at the end of year 1 to \$7 million at the end of year 3.

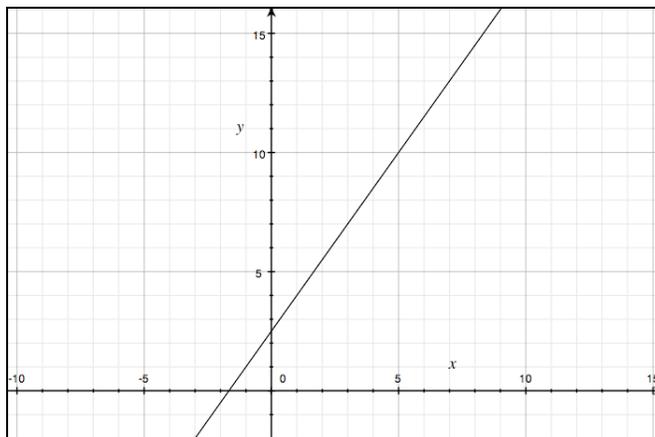
- a. Use the two (year, profit) data points (1, 4) and (3, 7) to find the linear relationship  $y = mx + b$  between  $x = \text{year}$  and  $y = \text{profit}$ .

$$m = \frac{7-4}{3-1} = \frac{3}{2} = 1.5$$

$$y - 4 = 1.5(x - 1)$$

$$\boxed{y = 1.5x + 2.5}$$

- b. Draw a graph of the linear relationship.



- c. Find the company's profit at the end of year 2.

$$y = 1.5 \cdot 2 + 2.5 = 5.5$$

$\boxed{\$5.5 \text{ million}}$

- d. Assuming this relationship continues to hold, at the end of which year will the company's profit reach \$25 million?

$$25 = 1.5x + 2.5 \Rightarrow 1.5x = 22.5 \Rightarrow x = 15$$

$\boxed{\text{At the end of year 15}}$

2. A utility considers demand for electricity "low" if it is below 5 mkW (million kilowatts), "average" if it is at least 5 mkW but not more than 12 mkW, "high" if it is more than 12 mkW but not more than 25 mkW, and "critical" if it is more than 25 mkW. Express these levels in **interval notation**.

- a. "low":  $[0,5)$
- b. "average":  $[5,12]$
- c. "high":  $(12,25]$
- d. "critical":  $(25,\infty)$