



1

If  $h(x) = -x^2 + 3x - 2$  and  $k(x) = -2x - 5$ , what is the value of  $h(k(-2))$ ?

A. -6  
 B. -4  
 C. 0  
 D. 2

$k(-2) = -2(-2) - 5$   
 $= 4 - 5$   
 $= -1$

$h(-1) = -(-1)^2 + 3(-1) - 2$   
 $= -1 - 3 - 2$   
 $= -6$

2

Given  $f(x) = 2x^2 - 3x + 1$  and  $g(x) = -3x + 5$ , what is the value of  $(f \circ g)(-2)$ ? (grid-in)

$f(g(-2))$   
 $g(-2) = -3(-2) + 5$   
 $= 6 + 5$   
 $= 11$

$f(11) = 2(11)^2 - 3(11) + 1$   
 $= 210$

3

$g(n) = 4n$   
 $f(n) = 4n + 2$   
 Find  $g(f(n))$

$g(f) = 4f$   
 $= 4(4n + 2)$

4

$f(x) = x + 5$   
 $g(x) = -x^2 - 5x$   
 Find  $f(g(-4))$

$g(-4) = -(-4)^2 - 5(-4)$   
 $= -16 + 20$   
 $= 4$

$f(4) = 4 + 5 = 9$

5

Given  $f(x) = x^2 + 3x - 1$ , and  $g(x) = 2x - 1$ , what is the equivalent expression representing  $f(g(x))$ ?

A.  $2x^2 + 2x - 3$   
 B.  $4x^2 + 2x - 3$   
 C.  $2x^2 + 4x - 1$   
 D.  $4x^2 + 4x - 1$

$g^2 + 3g - 1$   
 $(a-b)^2 + 3(a-b) - 1$   
 $(2x-1)^2 + 3(2x-1) - 1$   
 $(2x)^2 - 2(2x)(1) + (1)^2 + 6x - 3 - 1$   
 $4x^2 - 4x + 1 + 6x - 3 - 1$   
 $4x^2 + 2x - 3$

6

$g(x) = 3x + 3$   
 $f(x) = x^3 - 3x^2$   
 Find  $g(f(x))$

$g(f) = 3f + 3$   
 $3(x^3 - 3x^2) + 3$

$(a+b)^2 = a^2 + 2ab + b^2$   
 $(a-b)^2 = a^2 - 2ab + b^2$   
 $a^2 - b^2 = (a-b)(a+b)$







7

The graph of a polynomial equation in the  $xy$ -plane contains the points  $(-1, 0)$ ,  $(2, 0)$ , and  $(3, 0)$ . Which of the following could be the equation of the graph?

- A)  $y = -x(2x)(3x)$   
 B)  $y = (x - 1)(x + 2)(x + 3)$   
 C)  $y = x(x - 1)(x - 2)(x + 3)$   
 D)  $y = (x + 1)^2(x - 2)(x - 3)$

$$x^2 - 5x + 6 = 0$$

$$(x - 2)(x - 3)$$

$$x = 2 \quad x = 3$$

Mode  
 $\sum$

8

The points  $(-3, 0)$ ,  $(1, 0)$ , and  $(2, 0)$  all lie in the  $xy$ -plane on the graph of the polynomial function  $f$ . Which of the following could define  $f$ ?

- A)  $f(x) = (x + 1)(x + 2)(x - 3)$   
 B)  $f(x) = (x + 1)(x - 2)(x + 3)$   
 C)  $f(x) = (x - 1)(x + 2)(x + 3)$   
 D)  $f(x) = (x - 1)(x - 2)(x + 3)$





1

$$g(n) = n + 1$$

$$f(n) = n^2 - n$$

Find  $g(f(8))$ 

$$f(8) = (8)^2 - (8) = 56$$

$$g(56) = (56) + 1 = 57$$

3

$$g(n) = 4n - 5$$

$$h(n) = 2n + 1$$

Find  $g(h(8))$ 

$$h(8) = 2(8) + 1 = 17$$

$$g(17) = 4(17) - 5 = 63$$

4

The function  $g$  is defined by  $g(x) = ax^2 - 2x - 5$  and  $g(-1) = 1$ . What is the value of  $g(2)$ ?

$$a(-1)^2 - 2(-1) - 5 = 1$$

Shift Solve  $a = 4$

$$g(2) = 4(2)^2 - 2(2) - 5 = 7$$

$$h(a) = -2a^3 + 3a$$

$$g(a) = a - 3$$

Find  $h(g(-1))$ 

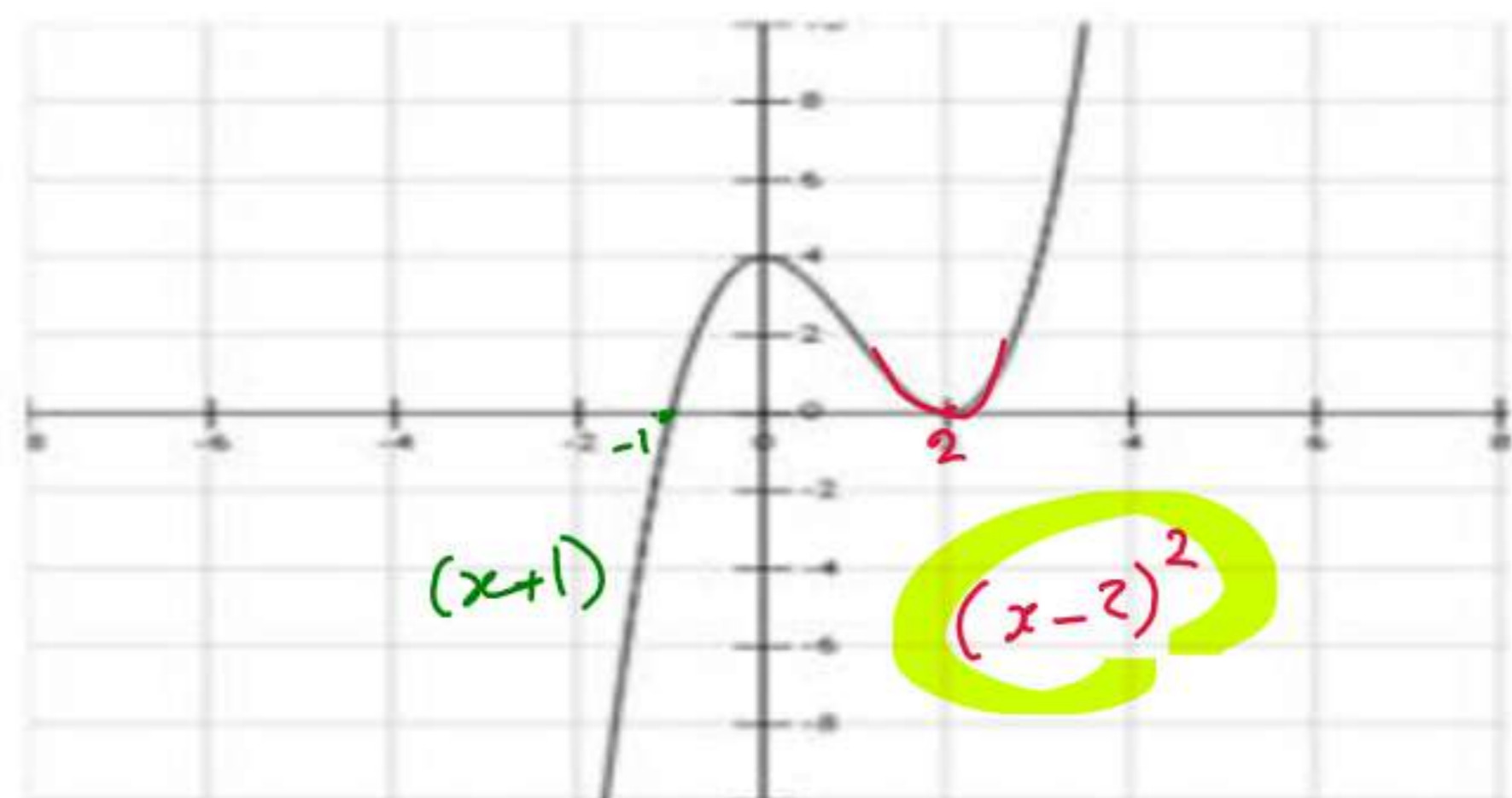
$$g(-1) = -1 - 3 = -4$$

$$h(-4) = -2(-4)^3 + 3(-4) = 116$$





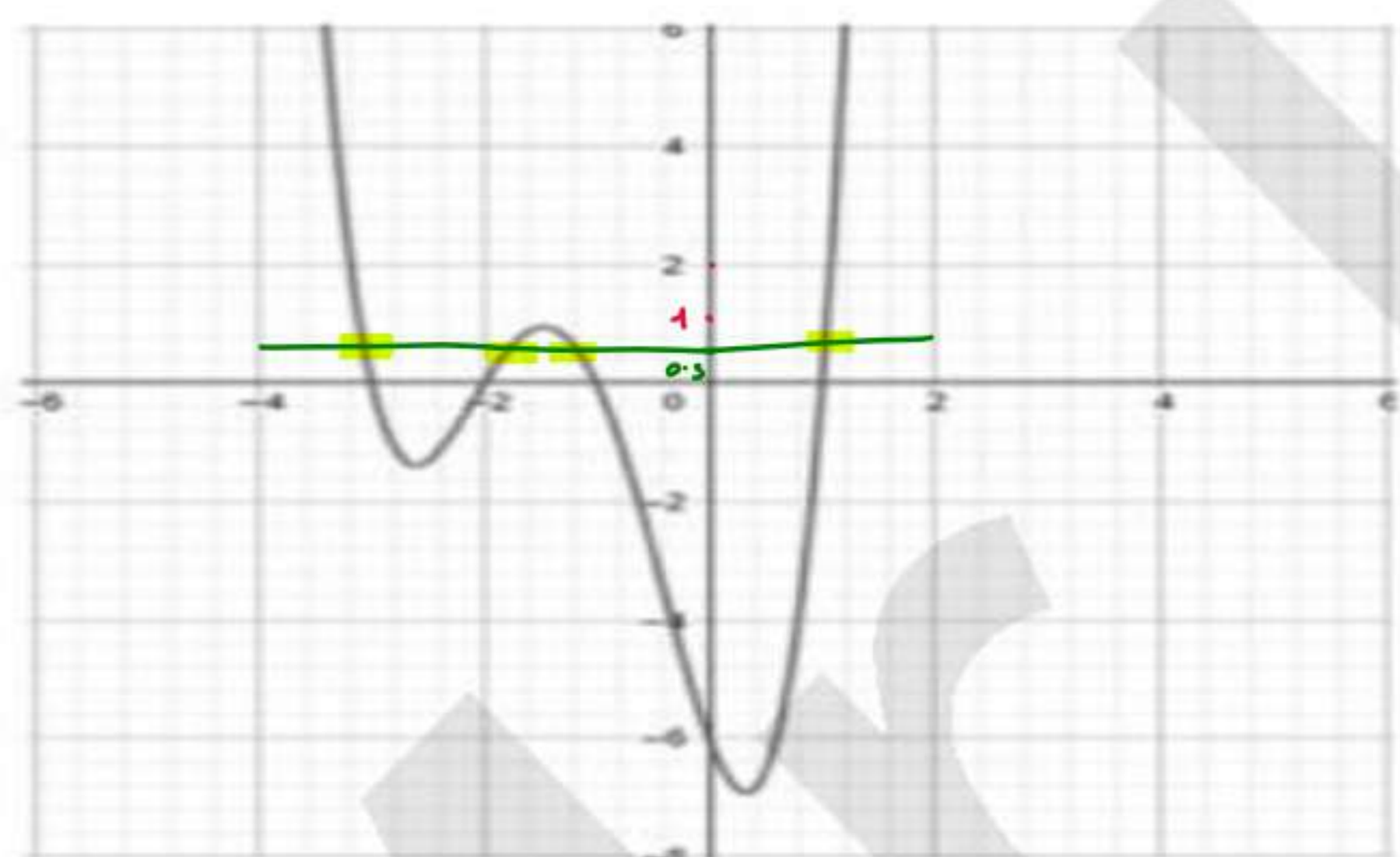
1



The graph plotted above represents which of the following functions?

- A.  $f(x) = (x + 1)(x - 2)^2$
- B.  $f(x) = (x - 1)(x + 2)^2$
- C.  $f(x) = (x + 1)(x - 2)$
- D.  $f(x) = (x - 2)(x + 1)^2$

2



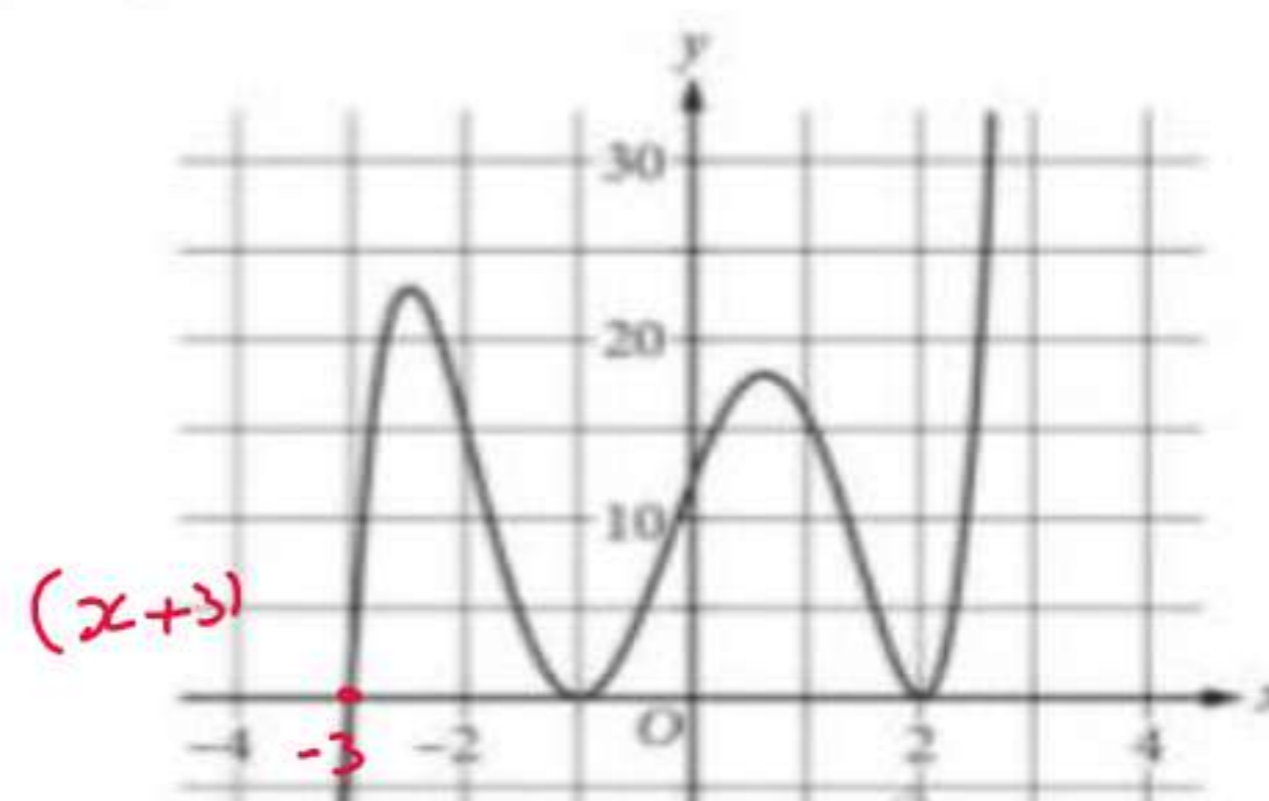
The graph above depicts a function  $f(x)$ . How many solutions does the equation  $f(x) = 0.5$  admit?

- A. 1
- B. 2
- C. 3
- D. 4

Handwritten notes for question 2:

- $x$  (with a red arrow pointing to the right)
- $-x$  (with a red arrow pointing to the left)
- $x^2$  (with a red arrow pointing to the right)
- $-x^2$  (with a red arrow pointing to the left)
- $x^3$  (with a red arrow pointing to the right)
- $-x^3$  (with a red arrow pointing to the left)
- $x^4$  (with a red arrow pointing to the right)
- $-x^4$  (with a red arrow pointing to the left)

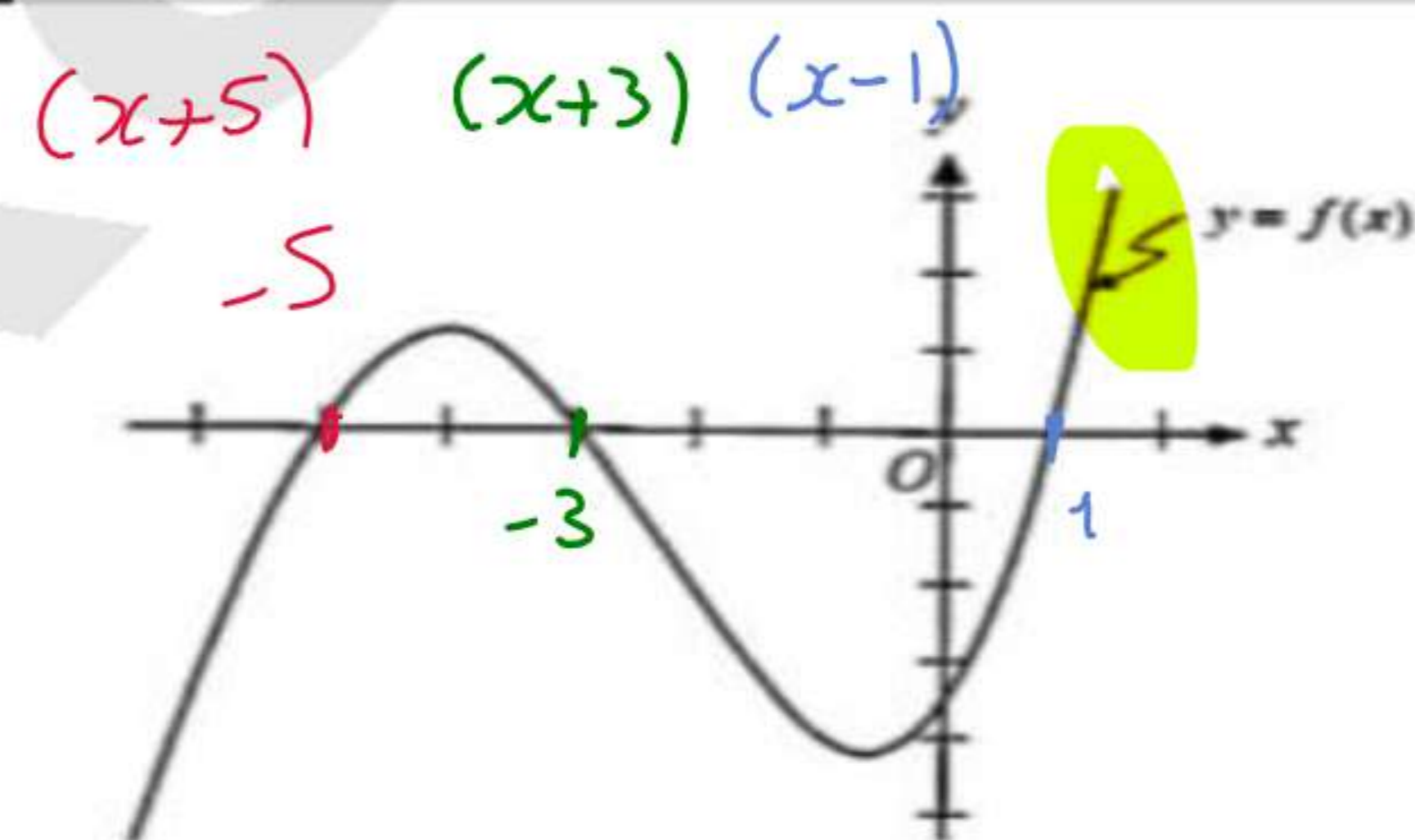
3



The graph of the function  $f$  is shown in the  $xy$ -plane above, where  $y = f(x)$ . Which of the following functions could define  $f$ ?

- A.  $f(x) = (x - 3)(x - 1)^2(x + 2)^2$
- B.  $f(x) = (x - 3)^2(x - 1)(x + 2)$
- C.  $f(x) = (x + 3)(x + 1)^2(x - 2)^2$
- D.  $f(x) = (x + 3)^2(x + 1)(x - 2)$

4



The graph of the function  $f$  is shown in the  $xy$ -plane above. Which of the following could define  $f$ ?

- A.  $f(x) = \frac{1}{4}(x + 5)(x + 3)(x - 1)$
- B.  $f(x) = -\frac{1}{4}(x + 5)(x + 3)(x - 1)$
- C.  $f(x) = \frac{1}{4}(x - 5)(x - 3)(x + 1)$
- D.  $f(x) = -\frac{1}{4}(x - 5)(x - 3)(x + 1)$

Mr. Kably





1

If  $f(x) = -2x + 8$ , then  $f^{-1}(1) =$

- A.  $9/2$
  - B.  $7/2$**
  - C.  $2/9$
  - D. 0
- Handwritten work:  
 $y = -2x + 8$   
 $1 - 8 = -2x$   
 $-7 = -2x$   
 $\frac{-7}{-2} = x$

2

Find the inverse of the function

$f(x) = 2(x - 4)^2, x \geq 0$

- ~~A~~   $f^{-1}(x) = \sqrt{1/2(x - 4)}$
- ~~B~~   $f^{-1}(x) = 1/2\sqrt{x + 4}$
- C**   $f^{-1}(x) = \sqrt{1/2x} + 4$
- D   $f^{-1}(x) = 1/2\sqrt{x} + 4$

Handwritten work:  
 $x = 2(y - 4)^2$   
 $\frac{x}{2} = (y - 4)^2$   
 $\sqrt{\frac{x}{2}} = y - 4$   
 $\sqrt{\frac{x}{2}} + 4 = y$

3

If  $f(x) = -2x + 6$ , then  $f^{-1}(x) =$

- A.  $2 - x/6$
- B.  $2/6 - x$
- C.  $(6 - x)/2$**
- D.  $2x - 6$

Handwritten work:  
 $x = -2y + 6$   
 $2y = 6 - x$   
 $y = \frac{6 - x}{2}$

4

Which of the following is the inverse function of  $f(x) = 2x - 3$ ?

- A**   $f^{-1}(x) = (x + 3)/2$
- $f^{-1}(x) = x + 3/2$
- $f^{-1}(x) = x/2 + 3$
- $f^{-1}(x) = (2x - 3 + 3)/2$

Handwritten work:  
 $x = 2y - 3$   
 $x + 3 = 2y$   
 $\frac{x + 3}{2} = y$

5

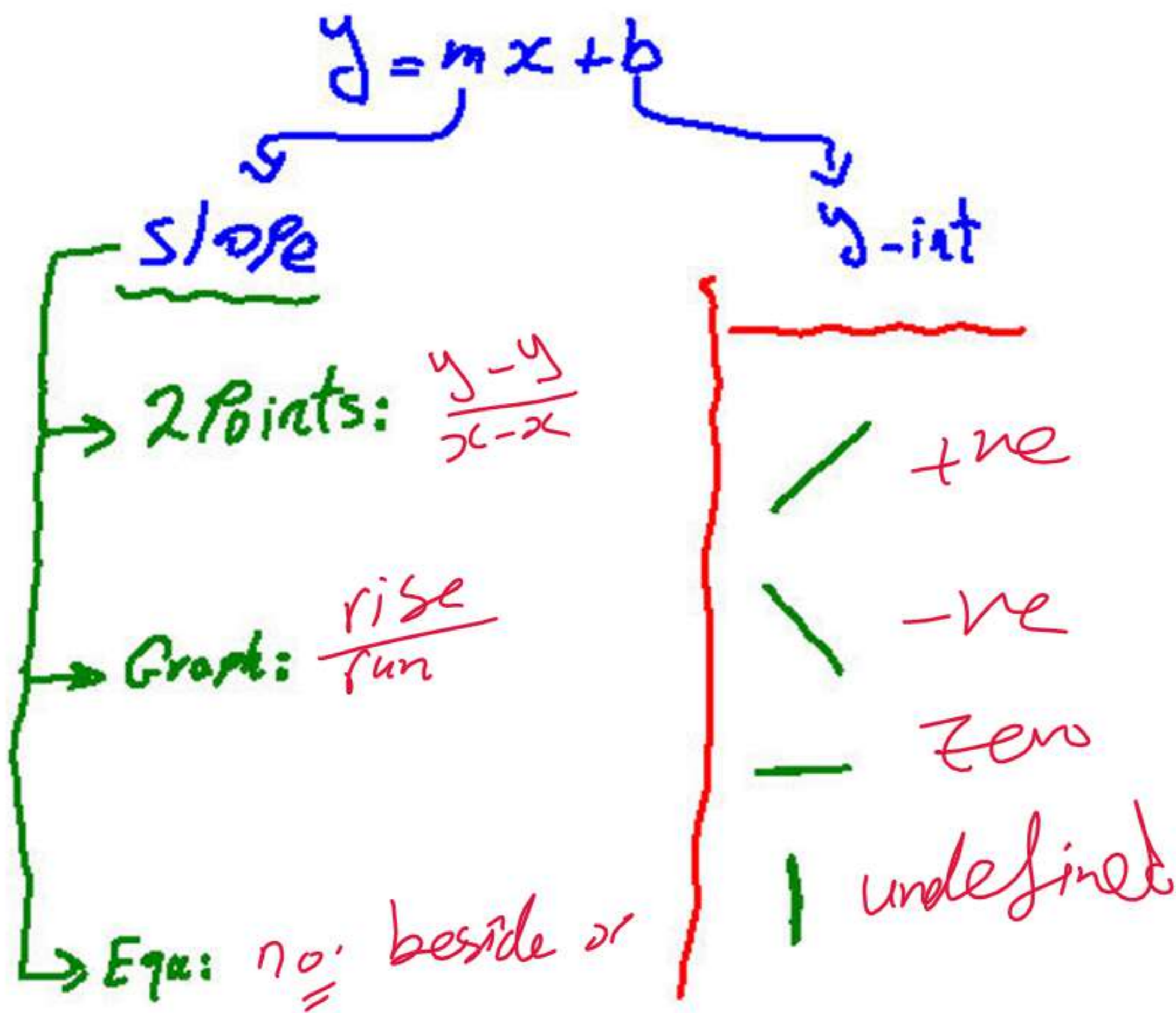
Find the inverse of the function

$f(x) = 2x - 5$

- A   $f^{-1}(x) = 1/2(x - 5)$
- B**   $f^{-1}(x) = 1/2(x + 5)$
- C   $f^{-1}(x) = 1/2x + 5$
- D   $f^{-1}(x) = 2x - 5$

Handwritten work:  
 $x = 2y - 5$   
 $x + 5 = 2y$   
 $\frac{x + 5}{2} = y$





2 Points  $(1, 5)$  and  $(4, 9)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 5}{4 - 1} = \frac{4}{3}$$

Eq:

ex:  $y = 2x - 5 \rightarrow m = 2$

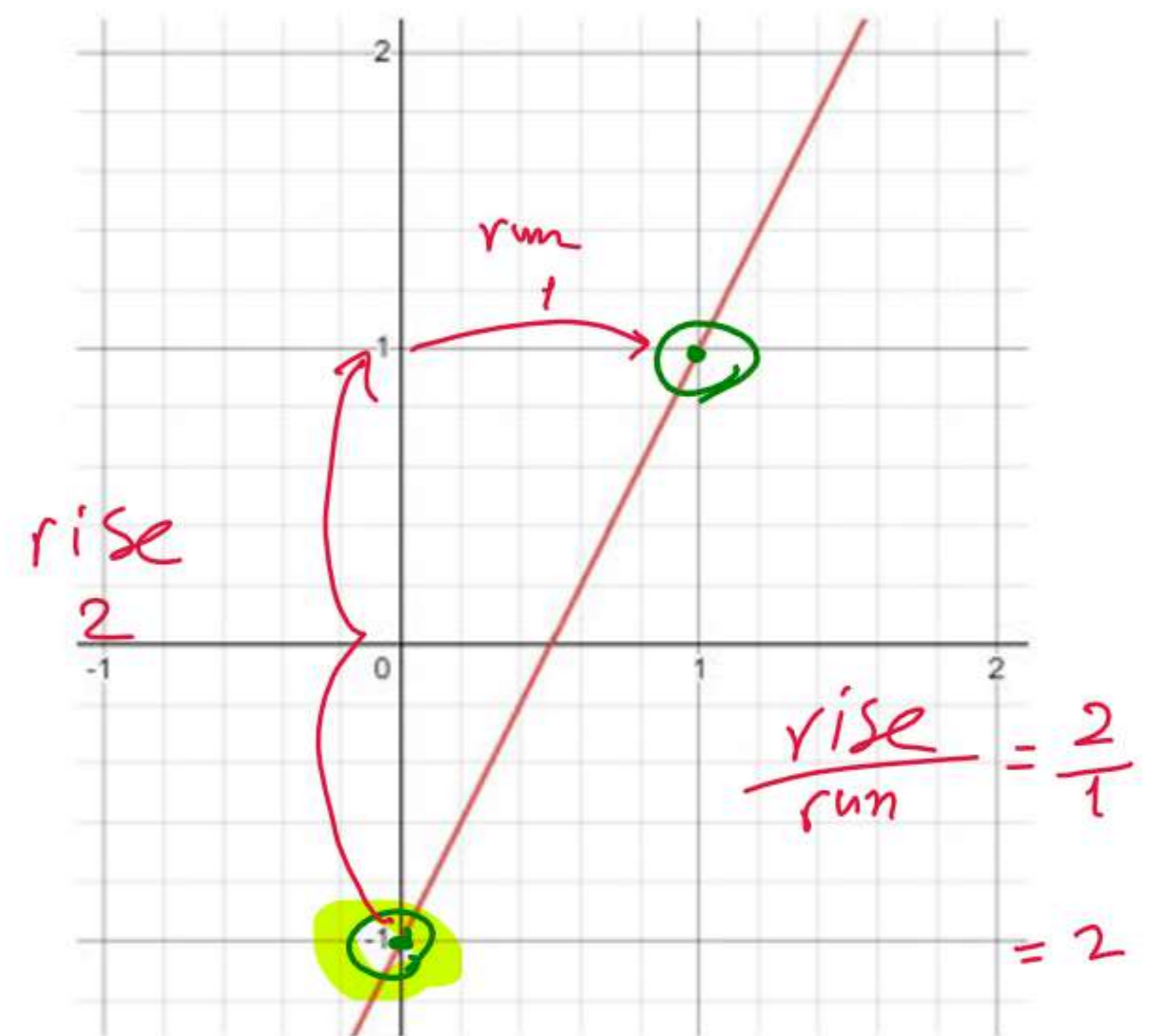
ex:  $y - 5x = 7$   
 $y = 5x + 7 \rightarrow m = 5$

$f(a) = b \rightarrow (a, b)$

$f(2) = b \rightarrow (2, b)$

$f(a) = 5 \rightarrow (a, 5)$

Graph







1

x	y
1	3
2	1
3	-1
4	-3
5	-5

The relationship between  $x$  and  $y$  is linear, and some values for the relationship are shown in the table above. When graphed in the  $xy$ -plane, the line that represents the relationship between  $x$  and  $y$  passes through the point  $(-1, a)$ . What is the value of  $a$ ?

- A) -1
- B) 5
- C) 7**
- D) 9

$$\frac{1-3}{2-1} = \frac{a+3}{-1-4}$$

$$\frac{-2}{1} = \frac{a+3}{-5}$$

2

$1(a+3) = 10$   
 $a+3 = 10$   
 $a = 10-3$   
**7**

Hours(x)	Total cost(y)
1	9
2	11
6	19
8	23

2 Points

Selected values representing the total cost  $y$ , in dollars, to rent a canoe for  $x$  hours are shown in the table above. The relationship between  $x$  and  $y$  is linear. If the data are graphed in the  $xy$ -plane, what is the **slope** of the line that represents this situation?

- A)  $\frac{1}{2}$
- B) 1
- C) 2**
- D)  $2\frac{1}{2}$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{11-9}{2-1}$$

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

Activat

3

In the  $xy$ -plane, what is the slope of the line that passes through the points  $(0,0)$  and  $(3,4)$ ?

- A)  $\frac{3}{4}$
- B)  $\frac{4}{3}$
- C) 3
- D) 4

4

For a function  $f$ ,  $f(-1)=12$  and  $f(1)=16$ . If the graph of  $y=f(x)$  is a line in the  $xy$ -plane, what is the slope of the line?

5

x	f(x)
0	-2
2	4
6	16

Some values of the linear function  $f$  are shown in the table above. What is the value of  $f(3)$  ?

- A) 6
- B) 7
- C) 8
- D) 9





$y = mx + b$

slope

→ 2 points:  $\frac{y_2 - y_1}{x_2 - x_1}$

→ Graph:  $\frac{\text{rise}}{\text{run}}$

→ Eq: no beside  $x$

y-int

↗ +ve

↘ -ve

— zero

| undefined.

//  $m_1 = \frac{2}{5}$      $m_2 = \frac{2}{5}$

⊥  $m_1 = \frac{2}{5}$      $m_2 = -\frac{5}{2}$

x-intercept →  $y = 0$

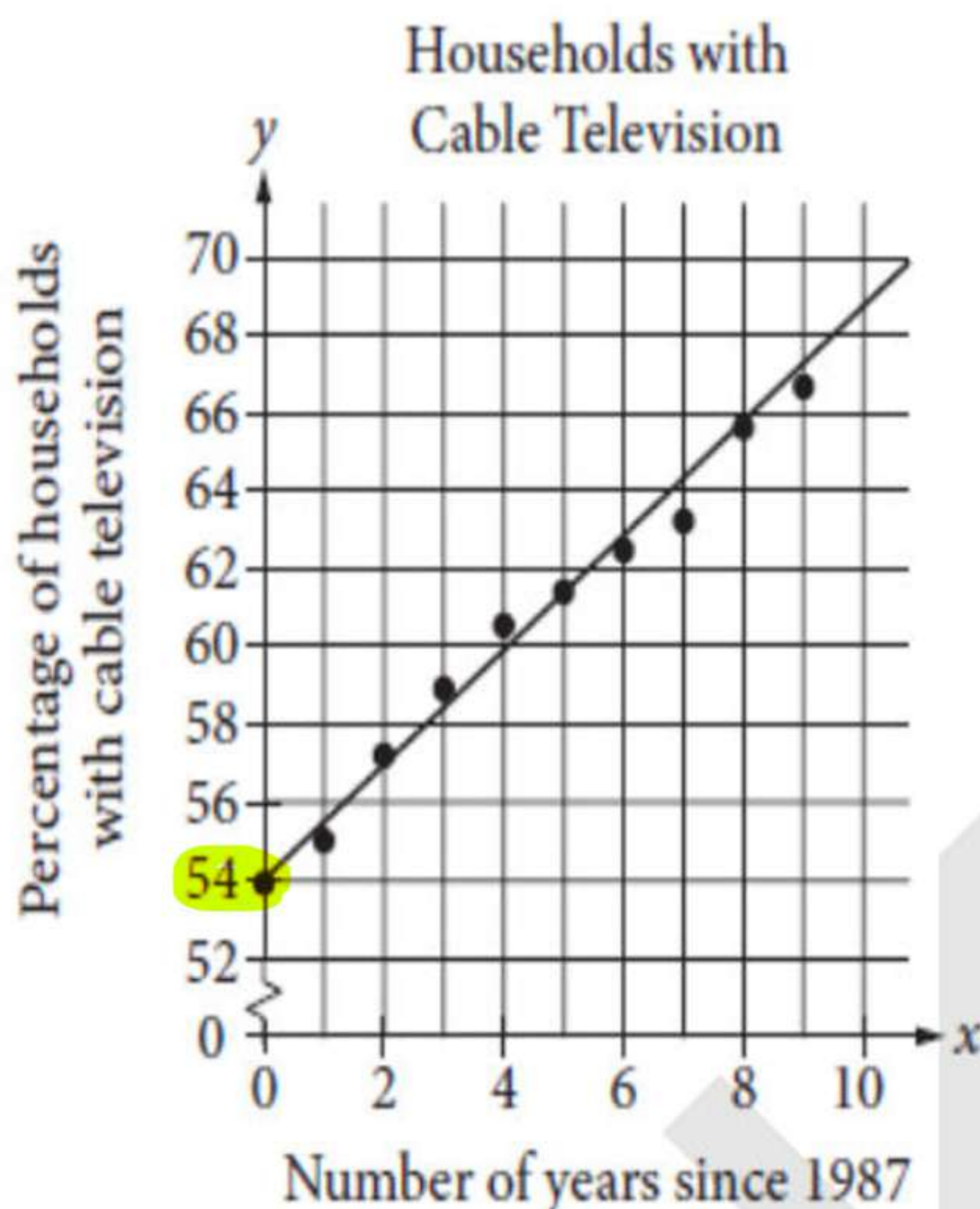
y-intercept →  $x = 0$





1

A cable company recorded the percentage of households in the United States that had cable television from 1987 to 1997. In the scatterplot below,  $x$  represents the number of years since 1987 and  $y$  represents the percentage of households with cable television. The line of best fit for the data is shown.



Which of the following is closest to the equation of the line of best fit shown?

A)  $y = 54x + \frac{7}{5}$

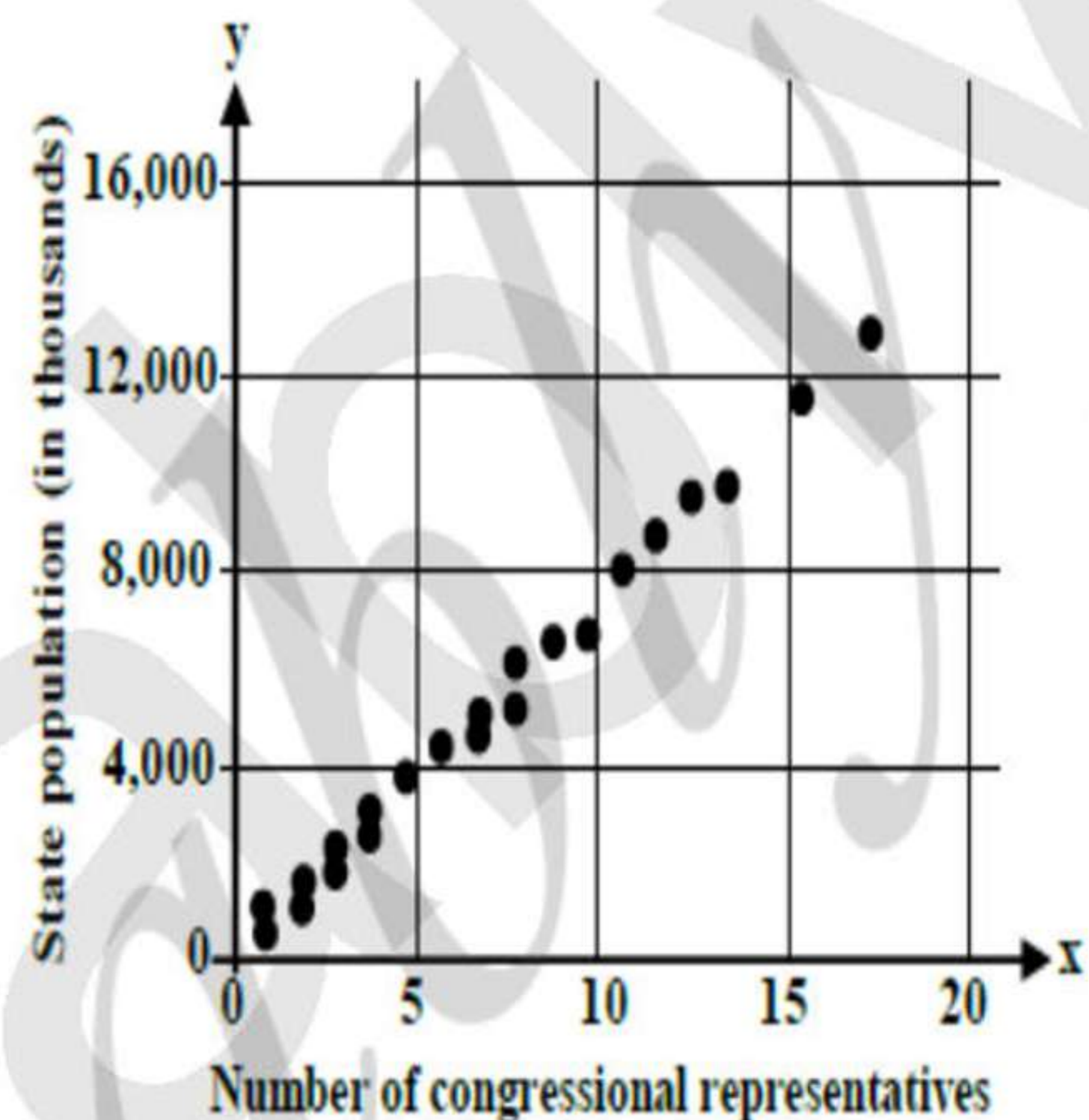
B)  $y = \frac{7}{5}x - 54$  ~~XX~~

C)  $y = \frac{7}{5}x + 54$

D)  $y = \frac{7}{5}x$

2

The scatterplot below shows the number of congressional representatives,  $x$ , and the population  $y$ , in thousands, for 25 of the 50 states in the United States.



Which of the following could be an equation of a line of best fit for these data?

A)  $y = -31 + 716x$

B)  $y = -31 - 716x$

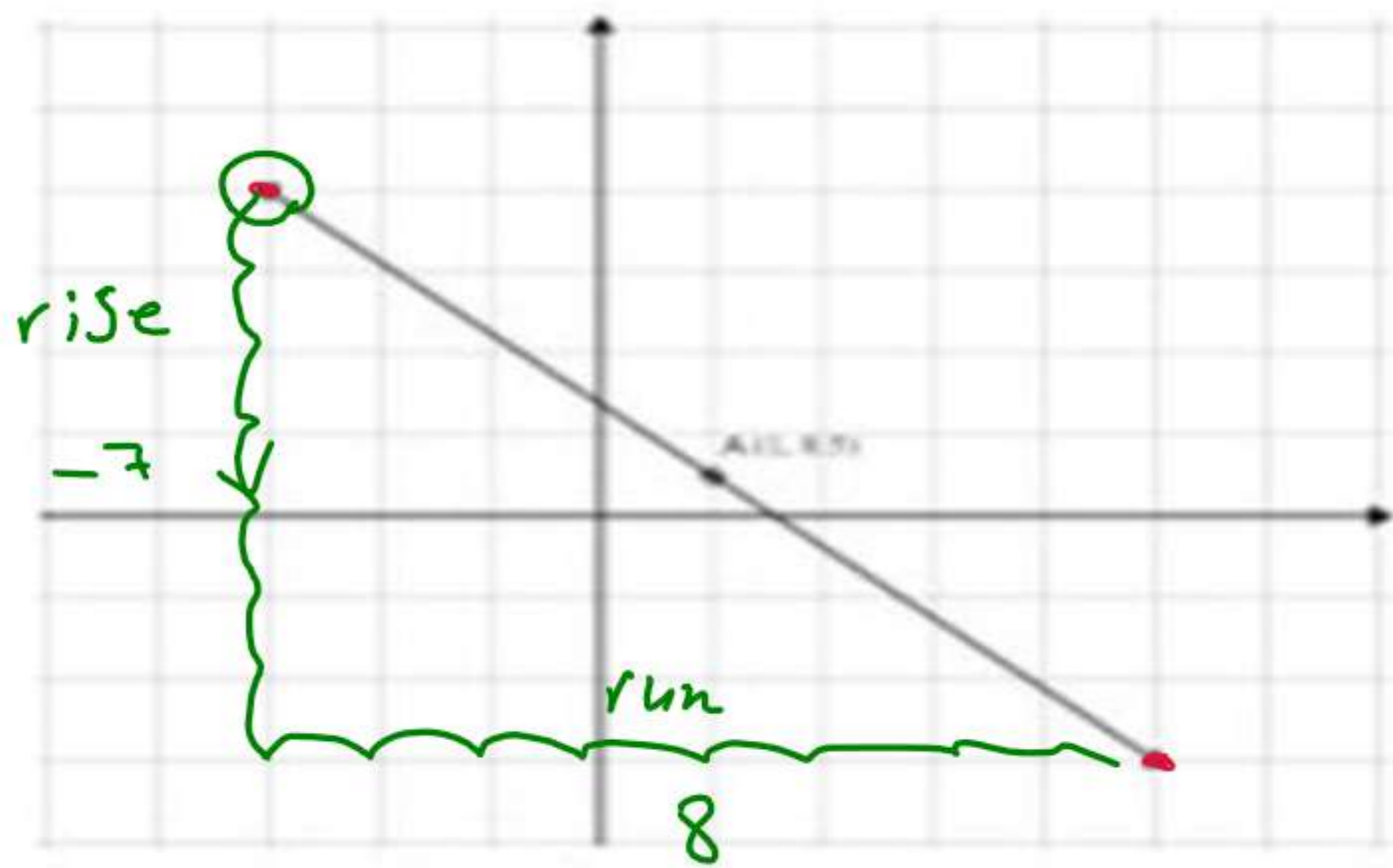
C)  $y = -31 + 7x$

D)  $y = -31 - 7x$





3

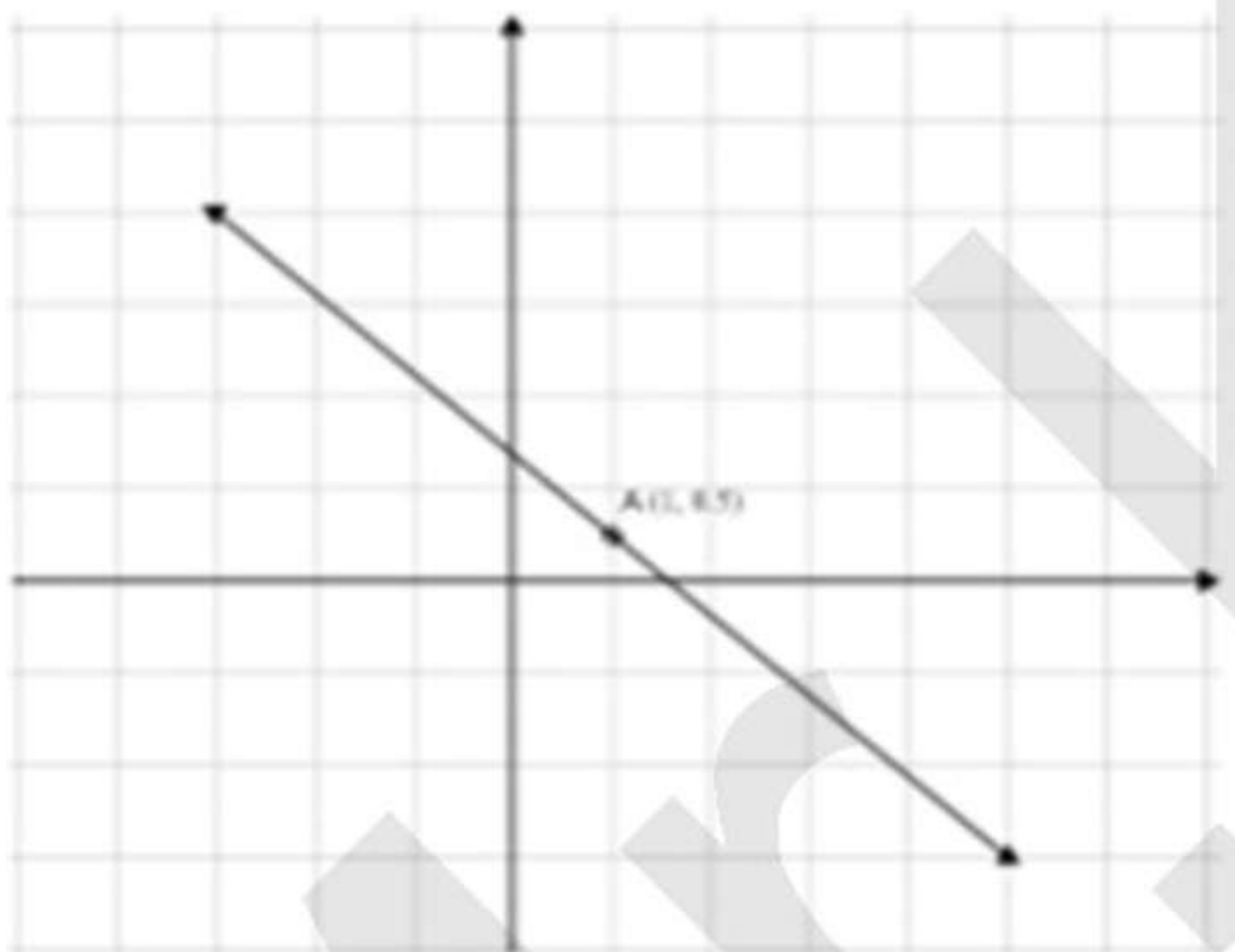


What is the slope of the line shown in the graph?

- A.  $-\frac{1}{2}$
- B.  $-\frac{7}{8}$**
- C.  $-\frac{8}{7}$
- D.  $-2$

$$\frac{\text{rise}}{\text{run}} = -\frac{7}{8}$$

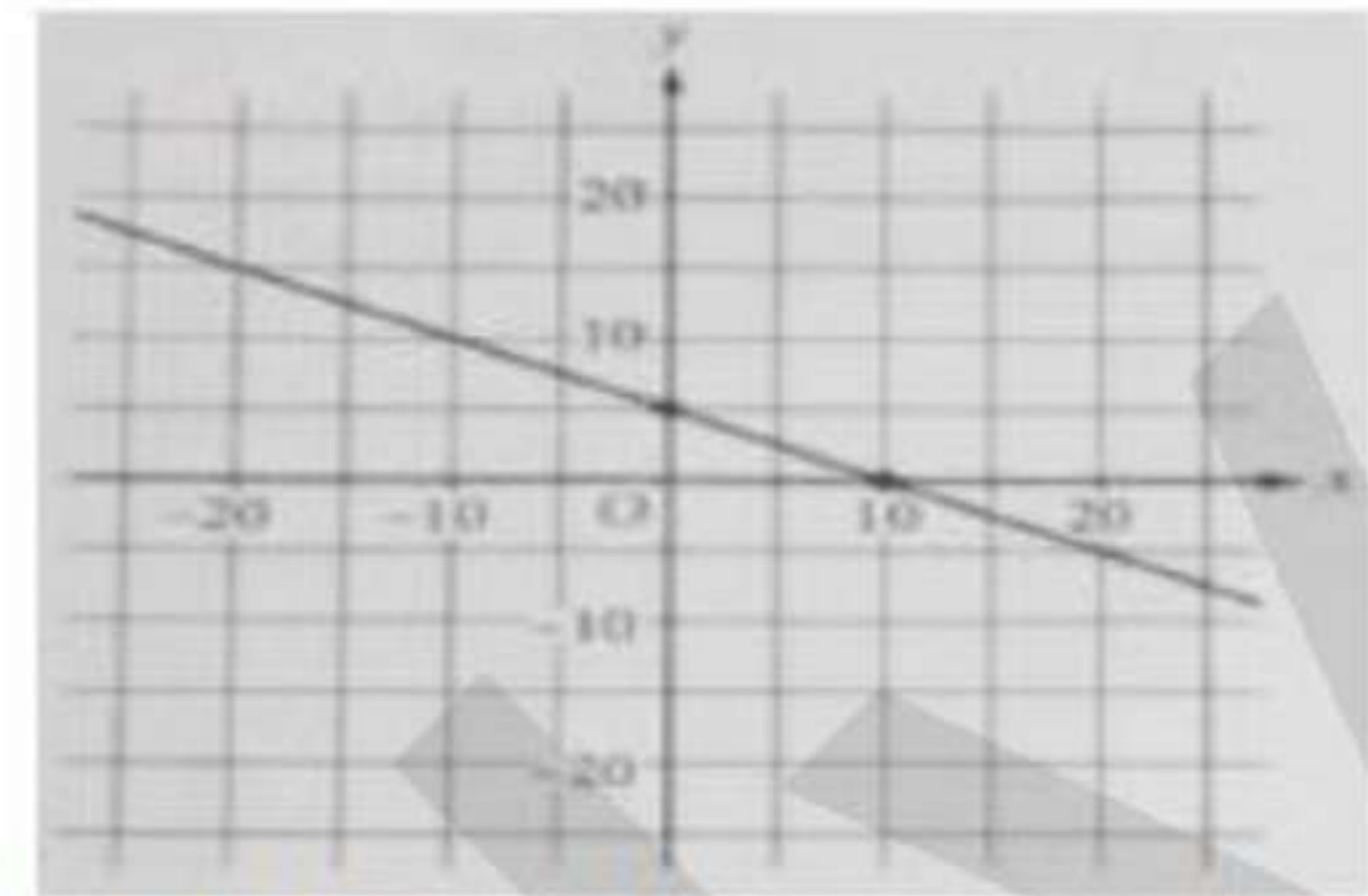
4



What is the equation of the line passing through  $A(1, 0.5)$  and perpendicular to the graphed line?

- A.  $y = \frac{1}{2}x$
- B.  $y = 2x - \frac{3}{2}$
- C.  $y = \frac{7}{8}x - \frac{3}{8}$
- D.  $y = \frac{8}{7}x - \frac{9}{14}$**

5



Which of the following is an equation of the line graphed in the  $xy$ -plane above?

- A)  $y = -\frac{1}{2}x + 10$
- B)  $y = -\frac{1}{2}x + 5$
- C)  $y = -2x + 10$
- D)  $y = -2x + 5$

$$m = -\frac{7}{8}$$

$$m_{\perp} = +\frac{8}{7}$$





$y = mx + b$

slope  
Average  
rate  
y Per x

y-int  
Initial  
starting  
at  $x=0$

$T = 500 + 20w$

$\underbrace{500}_b$        $\underbrace{20}_m w$