

1. Suppose that $f(x)$ is linear with an x -intercept of -6 and parallel to $y = -4 + 0.5x$. If $f(x) = b + mx$, then $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.

Part A: $b = 3$

Part B: $m = 0.5$

Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

2. Suppose that $f(x)$ is linear, passes through the point $(6, -7)$, and is parallel to $y = 3 - 0.5x$. If $f(x) = b + mx$, then $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.

Part A: $b = -4$

Part B: $m = -0.5$

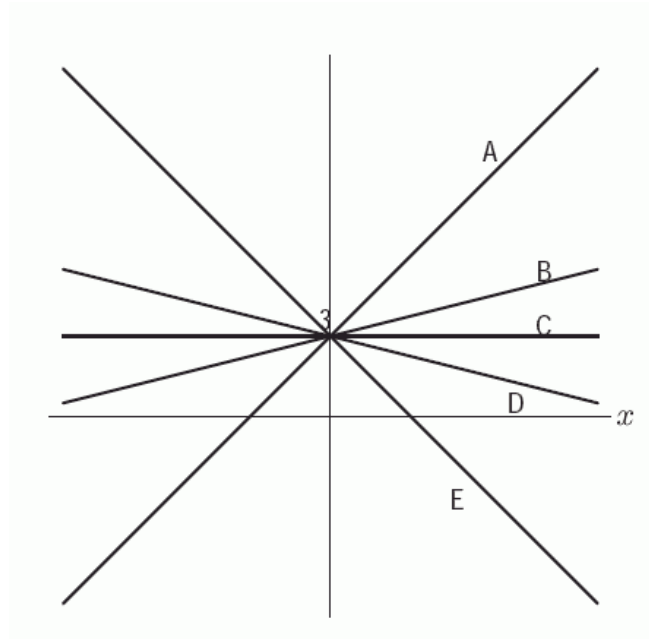
Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

3. Suppose that $f(x)$ is linear, has slope -1 , and forms the hypotenuse of the right triangle lying in Quadrant I whose area is 32 and whose legs lie on the x and y axes. If $f(x) = b + mx$, then $b = \underline{\hspace{1cm}}$ and $m = \underline{\hspace{1cm}}$.

Ans: $8, -1$

Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: hard

4. The following figure gives lines A , B , C , D , and E . Their equations are given below. Which is the equation for line E ?



- A) $f(x) = 3 + 2x$
 B) $f(x) = 3 + 0.5x$
 C) $f(x) = 3 - 0.5x$
 D) $f(x) = 3 - 2x$
 E) $f(x) = 3$

Ans: D Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

5. Mark all of the following functions that are increasing.

- A) $\frac{1}{3}f(x) - 1 = x$
 B) $-\frac{1}{3}g(x) = x + 1$
 C) $2h(x) - x = 3$
 D) $j(x) = 3x$
 E) $k(x) = 3$
 F) $2p(x) - x = 5$

Ans: A, C, D, F Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

6. Mark all of the following functions that have graphs that are parallel.

A) $\frac{1}{2}f(x) - 1 = -x$

B) $-\frac{1}{2}g(x) = -x + 1$

C) $2h(x) + x = 2$

D) $j(x) = -2x + 11$

E) $k(x) = 2$

F) $3p(x) + x = 2$

Ans: A, D Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

7. Mark all of the following functions that pass through the point (0, 6).

A) $\frac{1}{6}f(x) - 1 = x$

B) $-\frac{1}{6}g(x) = x + 1$

C) $5h(x) - x = 6$

D) $j(x) = 6x + 6$

E) $k(x) = 6$

F) $6p(x) - x = 6$

Ans: A, D, E Learning Objective: Determine the point of intersection of the graphs of two linear functions.; Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

8. Mark all of the following functions that are neither increasing nor decreasing.

A) $\frac{1}{3}f(x) - 1 = x$

B) $-\frac{1}{3}g(x) = x + 1$

C) $4h(x) - x = 3$

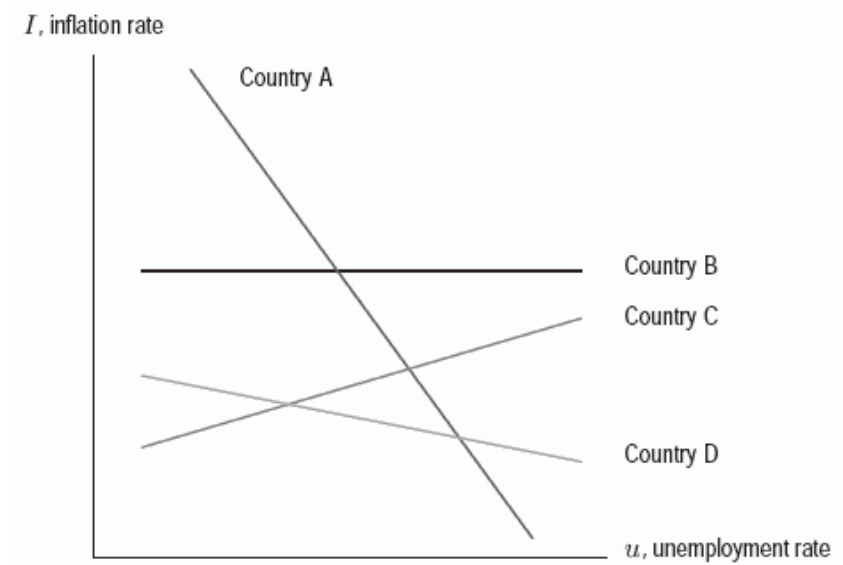
D) $j(x) = 3x$

E) $k(x) = 3$

F) $4p(x) - x = 7$

Ans: E Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

9. Many economists believe that a country's inflation rate will rise if its unemployment rate falls. The following figure shows the relationship between the inflation rate, I , and the unemployment rate, u , in four different countries.

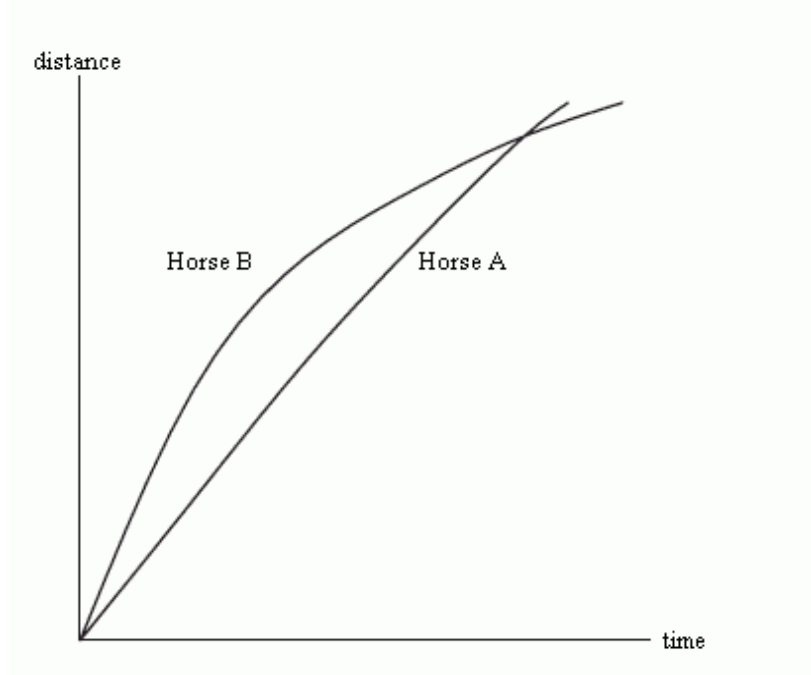


In which of the four countries does the relationship between the inflation rate and the unemployment rate seem opposite of what is normally expected?

Ans: C

Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function.; Use linear functions, equations, and inequalities to model real-world situations. difficulty: medium

10. The following figure show the distance of two horses from the starting point of a race as a function of time. Which horse was ahead for most of the race? (Answer "A" or "B")



Ans: B

Learning Objective: Use linear functions, equations, and inequalities to model real-world situations. difficulty: medium

11. You need to purchase a new computer printer. The cost of printer A is \$80, and its ink cartridges are \$29 each. The cost of printer B is \$125, and its ink cartridges are \$15 each. You estimate that you will need new ink cartridges about once a month. Find equations for the total cost of each printer after t months and use them to determine when you would have invested about the same amount of money in each. Round to the nearest tenth of a month.

Ans: 3.2 months

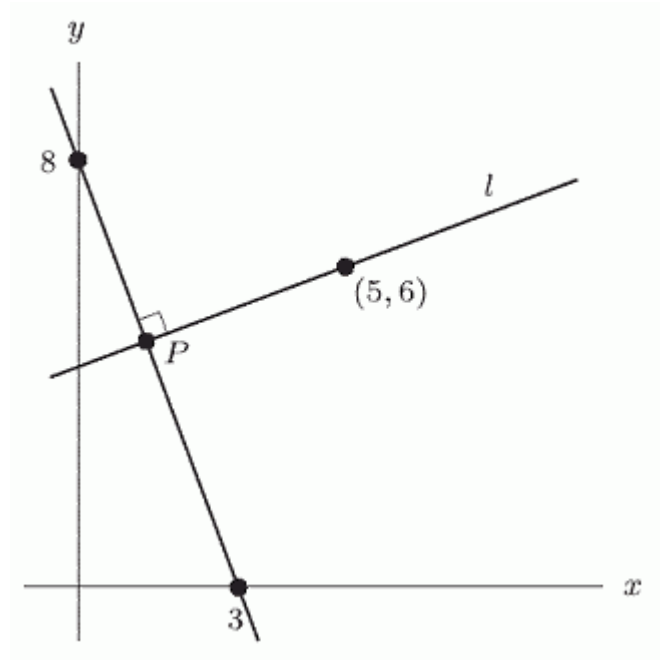
Learning Objective: Use linear functions, equations, and inequalities to model real-world situations. difficulty: medium

12. If $A = 65 + 2.2t$ and $B = 25 + 4.2t$ represent the population (in millions) of two countries, A and B, then in what year will the population of country A double the population of country B? Round to 2 decimal places.

Ans: 2.42

Learning Objective: Determine the point of intersection of the graphs of two linear functions. difficulty: medium

13. Find the vertical intercept of the line l shown in the following figure.



Ans: 4.125

Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

14. An airplane has room for 360 coach-fare seats. It can replace any 3 coach-fare seats with 2 first-class seats. Suppose the airplane is configured with x coach-fare seats and y first-class seats, with no space wasted. If you found a formula for y as a function of x , what would be the significance of the y -intercept?
- A) It is the number of first-class seats that could replace one coach seat.
 - B) It is the number of coach seats that could replace one first-class seat.
 - C) It is the number of coach seats, if there are no first-class seats.
 - D) It is the number of first-class seats, if there are no coach seats.

Ans: D Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function.; Use linear functions, equations, and inequalities to model real-world situations. difficulty: medium

15. The cost, C , of producing q items is given by the formula $C = C_0 + mq$, where C_0 and m are positive constants. If the quantity produced decreases, what happens to the cost of production?
- A) It increases.
 - B) It stays the same.
 - C) It decreases.
 - D) Cannot tell without knowing the values of C_0 and m .

Ans: C Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function.; Use linear functions, equations, and inequalities to model real-world situations. difficulty: hard

16. At a price of \$2.80 per gallon, the average weekly demand by consumers for gasoline is 42 gallons. If the price rises to \$3.00, the weekly demand drops to 39 gallons. Assuming demand is linear, let $Q = b + mp$, where Q is the weekly quantity of gasoline demanded and p is the price per gallon. What is the slope m , along with its economic significance?
- A) -0.60 ; if gasoline prices increase by \$1 per gallon, then there will be a 0.60 gallon decrease in weekly demand.
 - B) -3 ; if gasoline prices increase by \$1 per gallon, then there will be a 3 gallon decrease in weekly demand.
 - C) -15 ; if gasoline prices increase by \$1 per gallon, then there will be a 15 gallon decrease in weekly demand.
 - D) -0.20 ; if gasoline prices increase by \$1 per gallon, then there will be a 0.20 gallon decrease in weekly demand.

Ans: C Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function.; Use linear functions, equations, and inequalities to model real-world situations. difficulty: medium

17. At a price of \$2.75 per gallon, the average weekly demand by consumers for gasoline is 45 gallons. If the price rises to \$2.85, the weekly demand drops to 41 gallons. Assuming demand is linear, let $Q = b + mp$, where Q is the weekly quantity of gasoline demanded and p is the price per gallon. What is the economic interpretation of the p -intercept?
- A) The the price at which no gasoline will be demanded.
 - B) The number of gallons demanded if gas were free.
 - C) The amount the demand decreases if the price rises \$1.
 - D) The amount the price decreases if the demand is increased by 1 gallon.

Ans: A Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function.; Use linear functions, equations, and inequalities to model real-world situations. difficulty: medium

18. What is the equation of the line with x -intercept x_0 and y -intercept y_0 ?

A) $y = y_0 - \left(\frac{y_0}{x_0}\right)x$

B) $y = y_0 + \left(\frac{y_0}{x_0}\right)x$

C) $y = y_0 - x_0x$

D) $y = y_0 + x_0x$

E) There is not a unique equation for this line.

Ans: A Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: hard

19. An athlete wanting to strengthen his cardiovascular system will bench-press a weight, w , as many times, N , as possible. The following table shows the relationship between N and w .

Weight, w (in pounds)	120	130	140	150
Max # of bench-presses, N	27	25	23	21

Assuming linearity, let N be a function of w . What is the physical interpretation of the vertical intercept?

A) The decrease in the number of bench-presses the athlete can do as the weight increases by 1 pound.

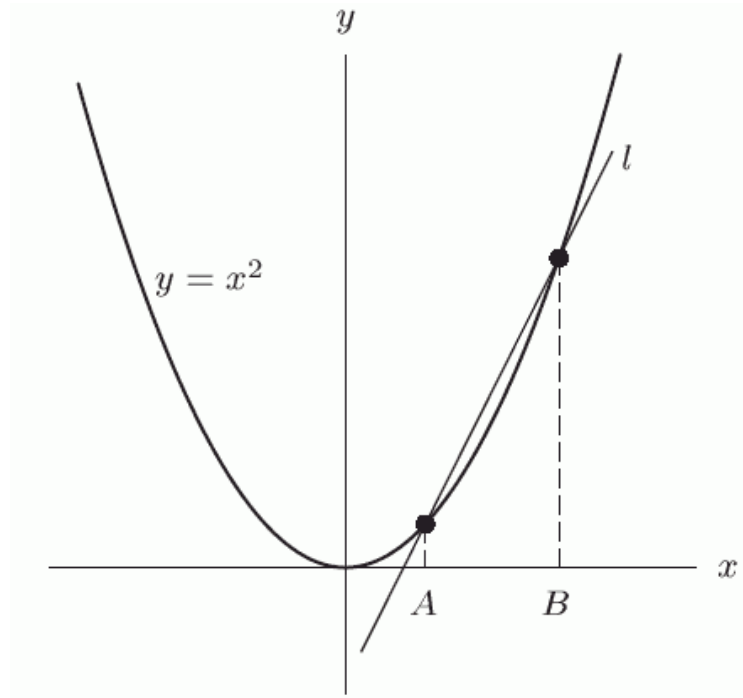
B) The number of bench-presses the athlete can do if there is no weight.

C) The decrease in the weight the athlete can lift as an additional bench-press is required.

D) The amount of weight at which the athlete can no longer do any bench-presses.

Ans: B Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function.; Use linear functions, equations, and inequalities to model real-world situations. difficulty: medium

20. What is the vertical intercept of the line l in the following figure in terms of the constants A and B ?



- A) $-B/A$
 B) $A+B$
 C) $-AB$
 D) $B-A$

Ans: C Learning Objective: Determine the point of intersection of the graphs of two linear functions.; Understand the effect of the parameters of a linear function on the graph of the function. difficulty: hard

21. The formula for the line intersecting the graph of $f(x) = \frac{1}{x}$ at $x = 0.2$ and $x = 2$ is given

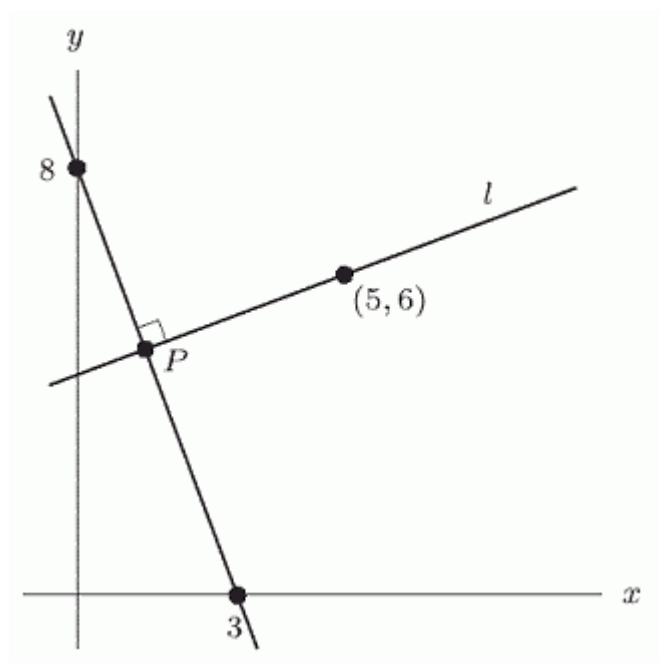
by $y = b + mx$, where $b = \underline{\hspace{2cm}}$ and $m = \underline{\hspace{2cm}}$.

Part A: $b = 5.5$

Part B: $m = -2.5$

Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: hard

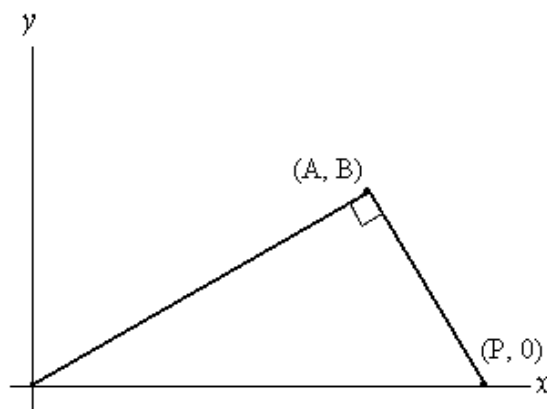
22. Find the x -coordinate of the point P shown in the following figure. Round to 3 decimal places.



Ans: 1.274

Learning Objective: Determine the point of intersection of the graphs of two linear functions. difficulty: hard

23. In the following figure, let $A = 8$ and $B = 4$. Find the equation of the line through (A, B) and $(P, 0)$ and use it to find the value of P .



Ans: 10

Learning Objective: Determine the point of intersection of the graphs of two linear functions.; Understand the effect of the parameters of a linear function on the graph of the function. difficulty: hard

24. Determine the point of intersection of the linear functions

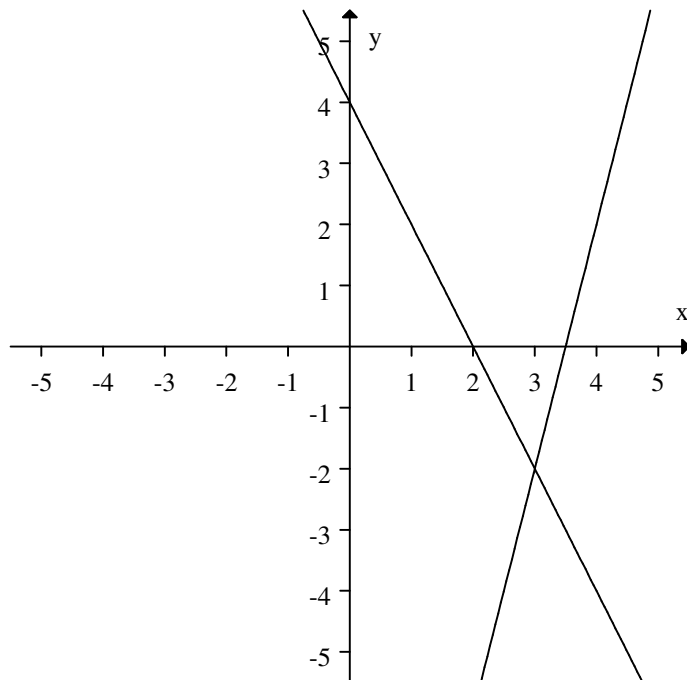
$$y = 2x + 4$$

$$y = 3x + 7$$

Ans: $(-3, -2)$

Learning Objective: Determine the point of intersection of the graphs of two linear functions. difficulty: medium

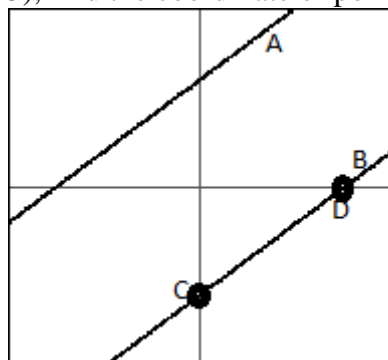
25. Determine the point of intersection of the linear functions



Ans: $(3, -2)$

Learning Objective: Determine the point of intersection of the graphs of two linear functions. difficulty: medium

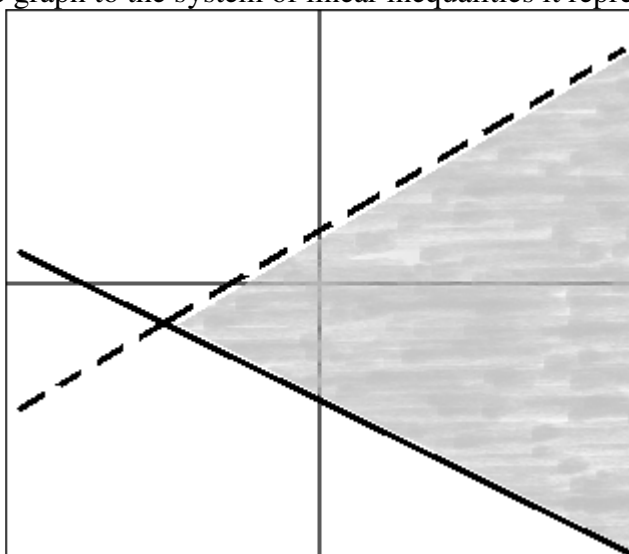
26. Line A in the figure is parallel to line B and line A has equation $y = \frac{3}{4}x + 3$. If point C is $(0, -3)$, find the coordinate of point D.



Ans: $(4, 0)$

Learning Objective: Understand the effect of the parameters of a linear function on the graph of the function. difficulty: medium

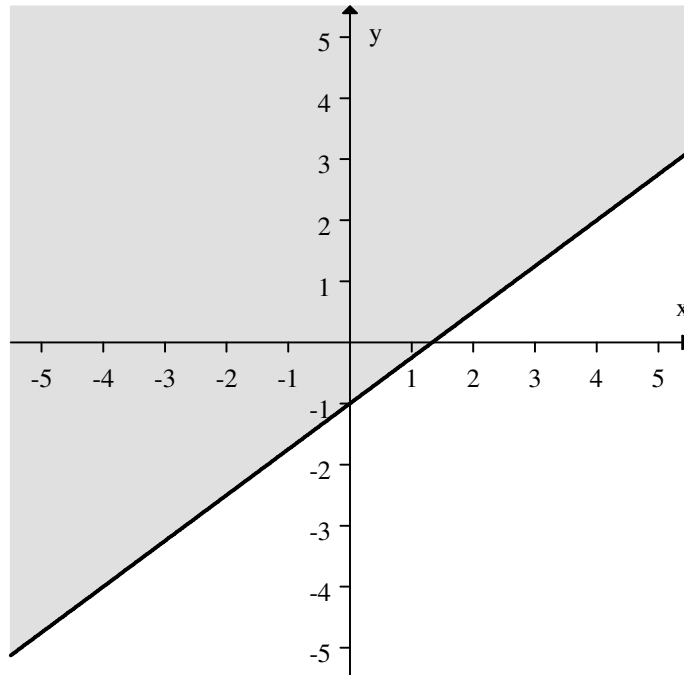
27. Match the graph to the system of linear inequalities it represents



- A) $y > \frac{2}{3}x + 1$
 $y \geq -\frac{1}{3}x - 2$
- B) $y < \frac{2}{3}x + 1$
 $y \leq -\frac{1}{3}x - 2$
- C) $y < \frac{2}{3}x + 1$
 $y \geq -\frac{1}{3}x - 2$
- D) $y \leq \frac{2}{3}x + 1$
 $y \geq -\frac{1}{3}x - 2$

Ans: C Learning Objective: Use linear functions, equations, and inequalities to model real-world situations. difficulty: easy

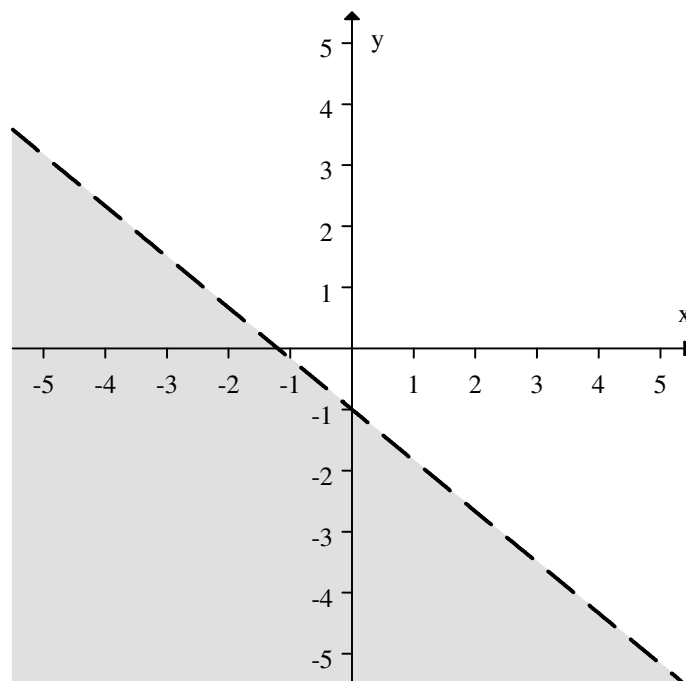
28. Match the graph to the linear inequality it represents.



- A) $y \geq \frac{3}{4}x + 1$
- B) $y \geq \frac{3}{4}x - 1$
- C) $y \leq \frac{4}{3}x - 1$
- D) $y \leq -\frac{3}{4}x - 1$

Ans: B Learning Objective: Use linear functions, equations, and inequalities to model real-world situations. difficulty: easy

29. Match the graph to the linear inequality it represents.



- A) $y \geq \frac{5}{6}x + 1$
- B) $y \leq -\frac{5}{6}x - 1$
- C) $y \leq \frac{6}{5}x - 1$
- D) $y < -\frac{5}{6}x - 1$

Ans: D Learning Objective: Use linear functions, equations, and inequalities to model real-world situations. difficulty: easy

30. Determine the intersection of the linear functions

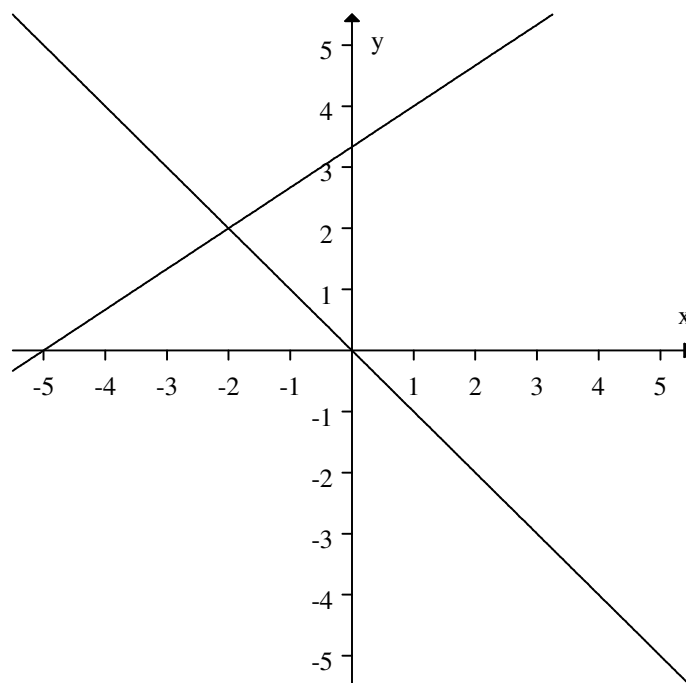
$$2x + 2y = 2$$

$$-2x - 3y = -6$$

Ans: $(-3, 4)$

Learning Objective: Determine the point of intersection of the graphs of two linear functions. difficulty: medium

31. Determine the intersection of the linear functions



Ans: $(-2, 2)$

Learning Objective: Determine the point of intersection of the graphs of two linear functions. difficulty: medium