

**A.REI.D.11: Other Systems 1**

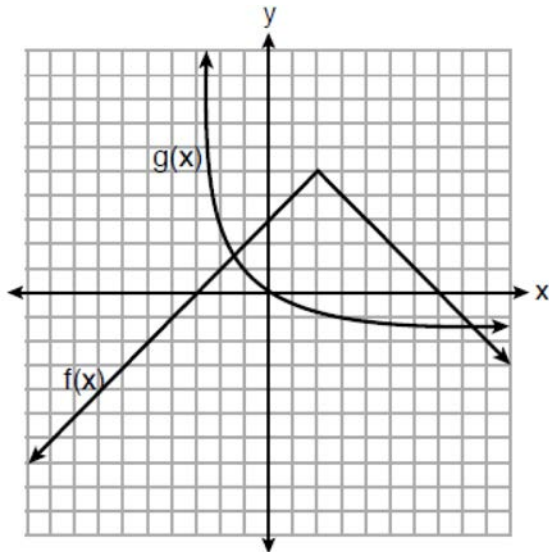
1 Given:  $f(x) = \frac{2}{3}x - 4$  and  $g(x) = \frac{1}{4}x + 1$

Four statements about this system are written below.

- I.  $f(4) = g(4)$
- II. When  $x = 12$ ,  $f(x) = g(x)$ .
- III. The graphs of  $f(x)$  and  $g(x)$  intersect at  $(12, 4)$ .
- IV. The graphs of  $f(x)$  and  $g(x)$  intersect at  $(4, 12)$ .

Which statement(s) are true?

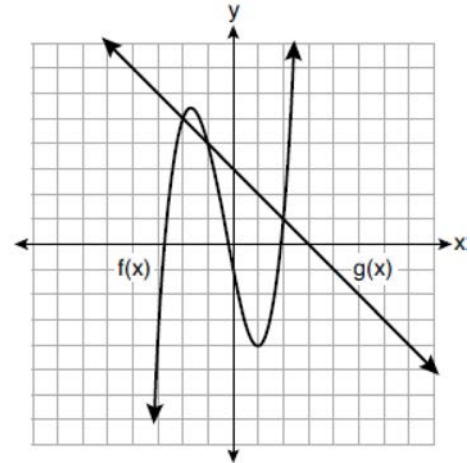
- 1) II, only
  - 2) IV, only
  - 3) I and IV
  - 4) II and III
- 2 The functions  $f(x)$  and  $g(x)$  are graphed below.



Based on the graph, the solutions to the equation  $f(x) = g(x)$  are

- 1) the  $x$ -intercepts
- 2) the  $y$ -intercepts
- 3) the  $x$ -values of the points of intersection
- 4) the  $y$ -values of the points of intersection

- 3 The functions  $f(x)$  and  $g(x)$  are graphed on the set of axes below.



For which value of  $x$  is  $f(x) \neq g(x)$ ?

- 1)  $-1$
  - 2)  $2$
  - 3)  $3$
  - 4)  $-2$
- 4 Two functions,  $y = |x - 3|$  and  $3x + 3y = 27$ , are graphed on the same set of axes. Which statement is true about the solution to the system of equations?
- 1)  $(3, 0)$  is the solution to the system because it satisfies the equation  $y = |x - 3|$ .
  - 2)  $(9, 0)$  is the solution to the system because it satisfies the equation  $3x + 3y = 27$ .
  - 3)  $(6, 3)$  is the solution to the system because it satisfies both equations.
  - 4)  $(3, 0)$ ,  $(9, 0)$ , and  $(6, 3)$  are the solutions to the system of equations because they all satisfy at least one of the equations.
- 5 The graphs of the functions  $f(x) = |x - 3| + 1$  and  $g(x) = 2x + 1$  are drawn. Which statement about these functions is true?
- 1) The solution to  $f(x) = g(x)$  is 3.
  - 2) The solution to  $f(x) = g(x)$  is 1.
  - 3) The graphs intersect when  $y = 1$ .
  - 4) The graphs intersect when  $x = 3$ .

6 If  $f(x) = 2x + 6$  and  $g(x) = |x|$  are graphed on the same coordinate plane, for which value of  $x$  is  $f(x) = g(x)$ ?

- 1) 6
- 2) 2
- 3) -2
- 4) -6

7 Which value of  $x$  results in equal outputs for  $j(x) = 3x - 2$  and  $b(x) = |x + 2|$ ?

- 1) -2
- 2) 2
- 3)  $\frac{2}{3}$
- 4) 4

8 Given the functions  $h(x) = \frac{1}{2}x + 3$  and  $j(x) = |x|$ , which value of  $x$  makes  $h(x) = j(x)$ ?

- 1) -2
- 2) 2
- 3) 3
- 4) -6

9 What is the total number of points of intersection for the graphs of the equations  $y = x^2$  and  $y = -x^2$ ?

- 1) 1
- 2) 2
- 3) 3
- 4) 0

10 What is one solution of the accompanying system of equations?

$$y = -x^2 + 5$$

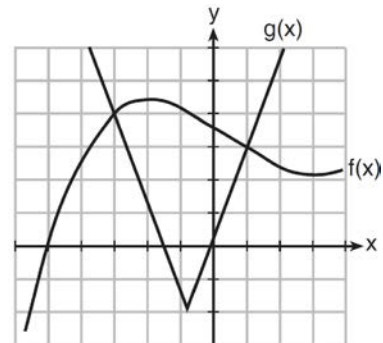
$$y = -0.5x^2 + 3$$

- 1) (3,5)
- 2) (0,5)
- 3) (-2,1)
- 4) (0,3)

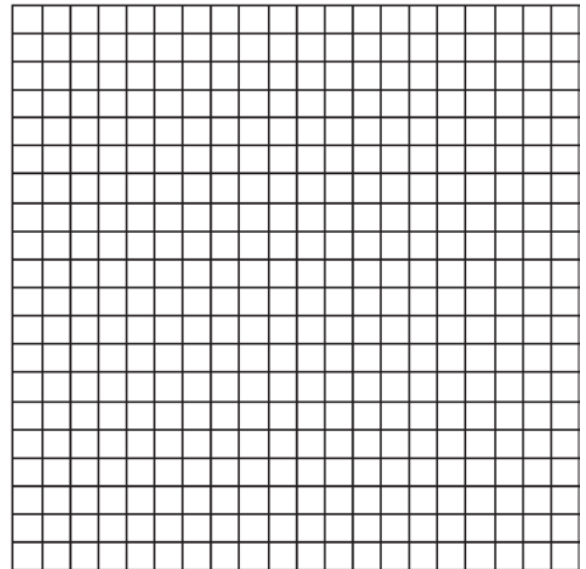
11 Which pair of equations would have  $(-1,2)$  as a solution?

- 1)  $y = x + 3$  and  $y = 2^x$
- 2)  $y = x - 1$  and  $y = 2x$
- 3)  $y = x^2 - 3x - 2$  and  $y = 4x + 6$
- 4)  $2x + 3y = -4$  and  $y = -\frac{1}{2}x - \frac{3}{2}$

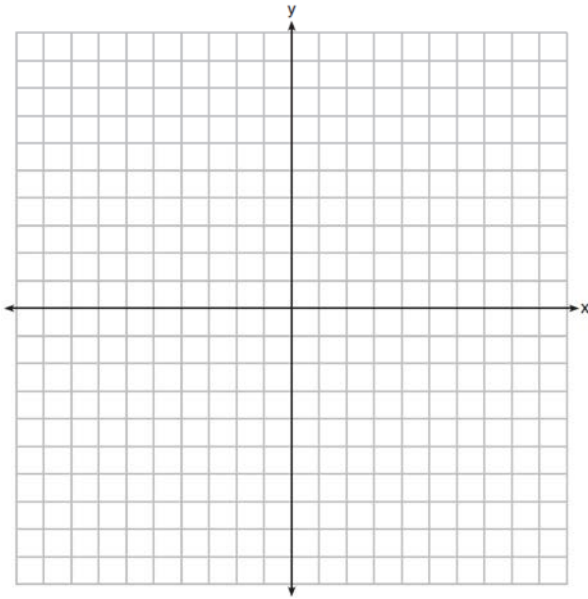
12 The graph below shows two functions,  $f(x)$  and  $g(x)$ . State all the values of  $x$  for which  $f(x) = g(x)$ .



13 Graph  $f(x) = |x|$  and  $g(x) = -x^2 + 6$  on the grid below. Does  $f(-2) = g(-2)$ ? Use your graph to explain why or why not.

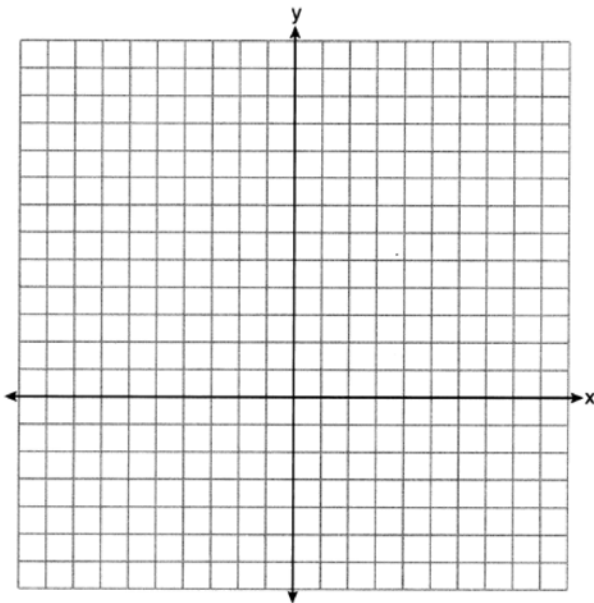


- 14 Graph  $f(x) = |x| + 1$  and  $g(x) = -x^2 + 6x + 1$  on the set of axes below.



Based on your graph, determine all values of  $x$  for which  $f(x) = g(x)$ .

- 15 On the set of axes below, graph  $f(x) = x^2 - 1$  and  $g(x) = 3^x$ .



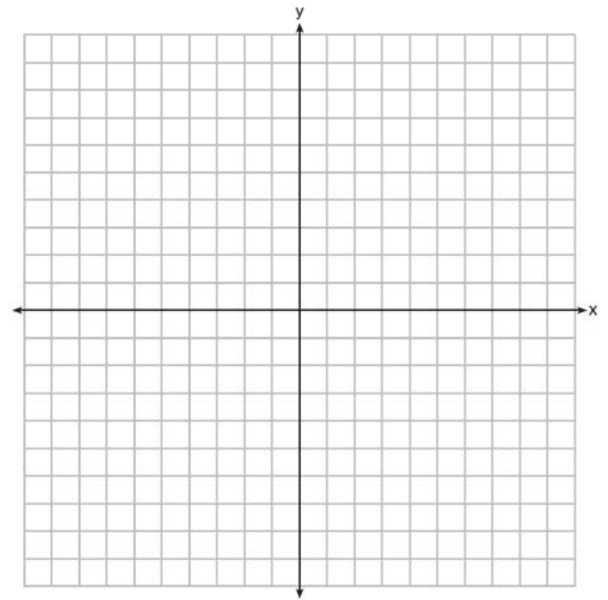
Based on your graph, for how many values of  $x$  does  $f(x) = g(x)$ ? Explain your reasoning.

- 16 On the set of axes below, graph

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

and

$$f(x) = \begin{cases} 2x + 1, & x \leq -1 \\ 2 - x^2, & x > -1 \end{cases}$$



How many values of  $x$  satisfy the equation  $f(x) = g(x)$ ? Explain your answer, using evidence from your graphs.

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### Answer Section

1 ANS: 4

I.  $f(4) = -\frac{4}{3}$  and  $g(4) = 2$ ; II.  $f(12) = 4$  and  $g(12) = 4$ 

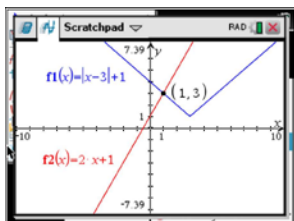
REF: 062111ai

2 ANS: 3 REF: 081819ai

3 ANS: 3 REF: 081914ai

4 ANS: 3 REF: 011518ai

5 ANS: 2



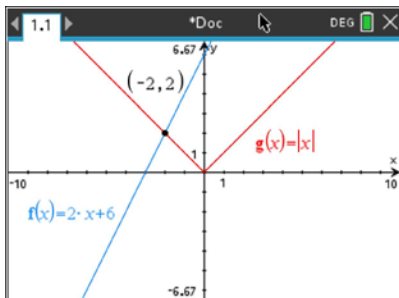
$$|x-3| + 1 = 2x + 1 \quad x-3 = 2x \quad x-3 = -2x$$

$$|x-3| = 2x \quad -3 = x \quad 3x = 3$$

$$\text{extraneous} \quad x = 1$$

REF: 061622ai

6 ANS: 3



REF: 012417ai

7 ANS: 2

$$|x+2| = 3x-2$$

$$x+2 = 3x-2$$

$$4 = 2x$$

$$x = 2$$

REF: 081702ai

8 ANS: 1

$$\frac{1}{2}x + 3 = |x| \quad -\frac{1}{2}x - 3 = x$$

$$\frac{1}{2}x + 3 = x \quad -x - 6 = 2x$$

$$x + 6 = 2x \quad -6 = 3x$$

$$6 = x \quad -2 = x$$

$$6 = x$$

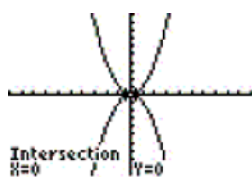
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9 ANS: 1

$$x^2 = -x^2$$

$$2x^2 = 0 \quad (0,0)$$

$$x = 0$$



X	Y <sub>1</sub>	Y <sub>2</sub>
-3	9	-9
-2	4	-4
-1	1	-1
0	0	0
1	1	-1
2	4	-4
3	9	-9

REF: 080611b

10 ANS: 3

$$-x^2 + 5 = -0.5x^2 + 3$$

$$-0.5x^2 = -2$$

$$x^2 = 4$$

$$x = \pm 2$$

REF: 060706b

11 ANS: 3

$$y = (-1)^2 - 3(-1) - 2 = 2, \quad y = 4(-1) + 6 = 2$$

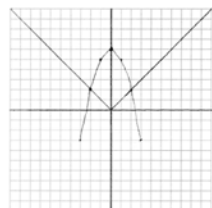
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12 ANS:

-3, 1

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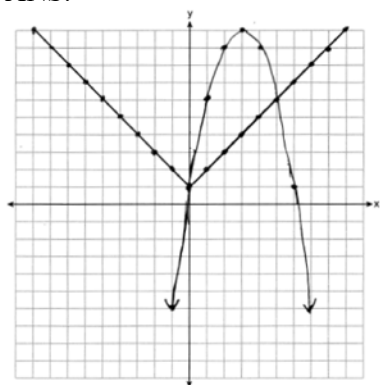
13 ANS:



Yes, because the graph of  $f(x)$  intersects the graph of  $g(x)$  at  $x = -2$ .

REF: 011733ai

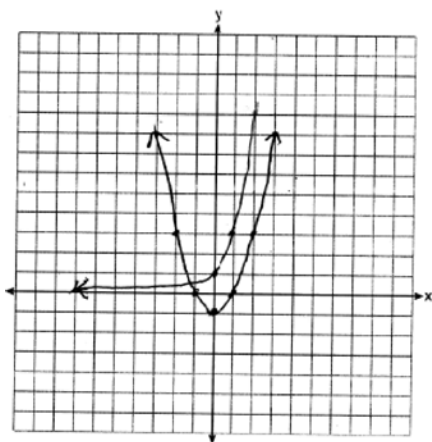
14 ANS:



$x = 0,5$

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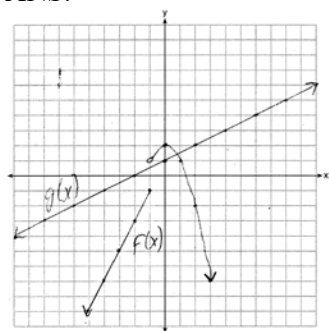
15 ANS:



$f(x) = g(x)$  for one value of  $x$  because the graphs intersect once.

REF: 062234ai

16 ANS:



1, because the graphs only intersect once.

REF: 061636ai