Practice Test 3

Systems of Equations and Inequalities

On the test you will be asked to solve systems using either graphing, substitution, or elimination. You must use the specified method to receive full credit.

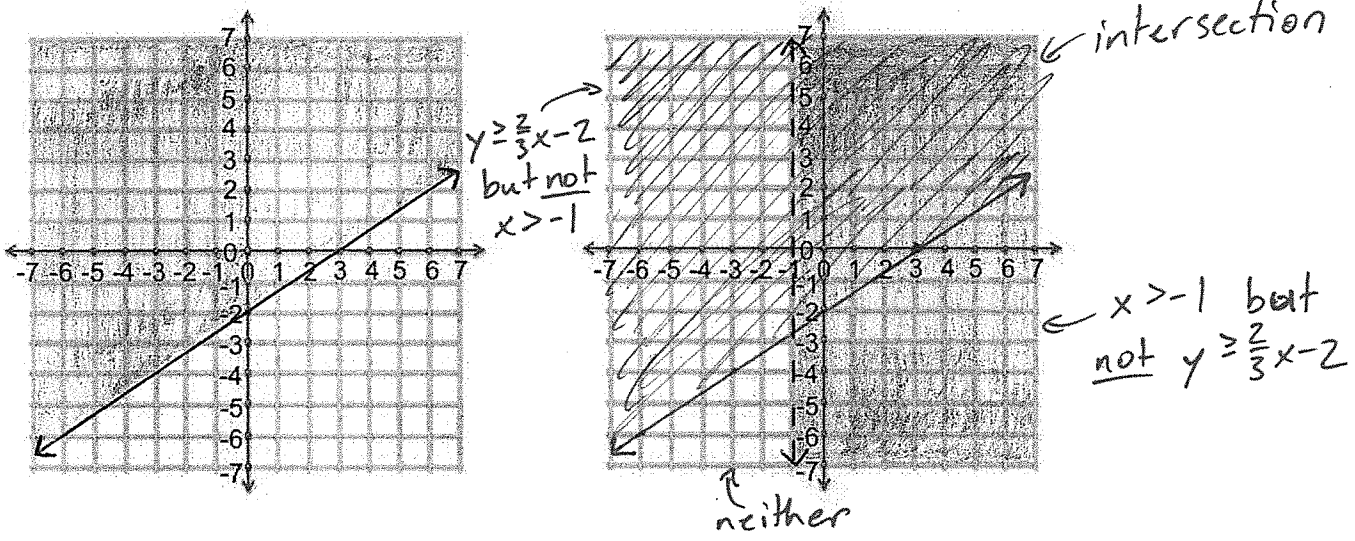
Solve each inequality for *x*.

1. $2x + 4 > -2$
   $-4 \quad -4$
   $\frac{2x}{2} > \frac{-6}{2}$
   $x > -3$

2. $-3 > 7 - 5x$
   $-7 \quad -7$
   $\frac{-10}{-5} > \frac{-5x}{-5}$
   $x > 2$

3. $3x \geq 4x + 1$
   $-4x \quad -4x$
   $-x \geq 1$
   $x \leq -1$

The graphs of $y \geq \frac{2}{3}x - 2$ and $x > -1$ are given below. Use them to answer questions 4 – 8.



4. List any <u>two</u> points that are in the <u>intersection</u> of these two solution sets.

   (0, 0) & (1, 1)

5. List any <u>two</u> points that are in the <u>union</u> of these two solution sets.

   (−4, 4) & (4, 4)

6. List a point that is a solution to $y \geq \frac{2}{3}x - 2$ but <u>not</u> a solution to $x > -1$.

   (−4, 4)

7. List a point that is a solution to $x > -1$ but <u>not</u> to $y \geq \frac{2}{3}x - 2$.

   (5, −2)

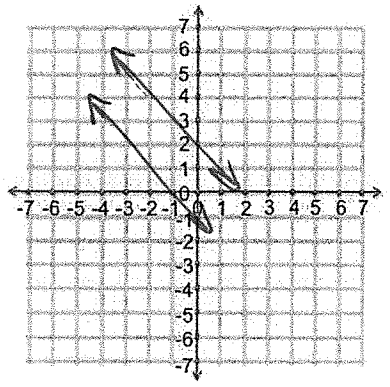
8. List any <u>two</u> points that are <u>not</u> a solution to either inequality.

   (−3, −6) & (−4, −6)

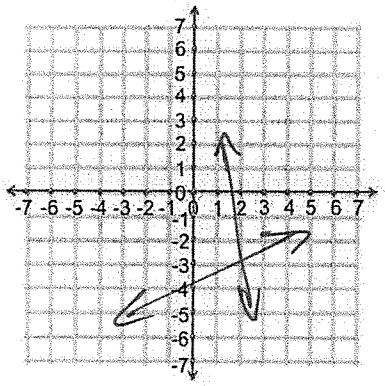
These answers are just examples

Draw an example of a system that has each number of solutions.

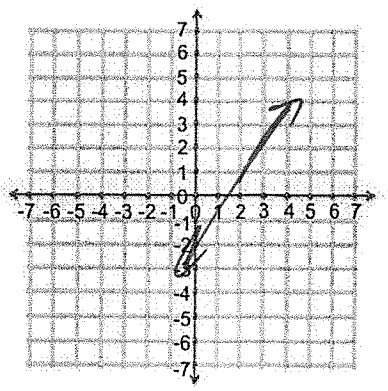
9. No solutions



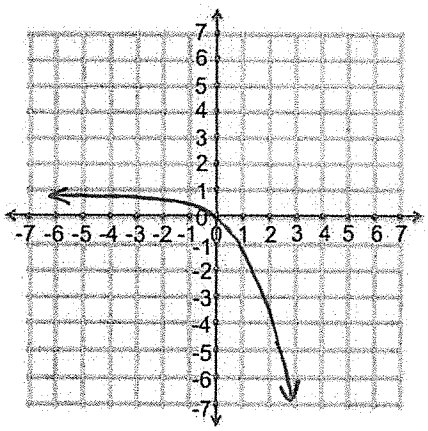
10. One solution



11. Infinite Solutions



12. Let $f(x) = -2^x + 1$. Graph $y = f(x)$ on the coordinate plane below and state the domain and range of f.



Domain: $(-\infty, \infty)$

Range: $(-\infty, 1)$

Solve by substitution:

13. $\begin{cases} y + 3x = 4 \\ -y - 2x = -5 \end{cases}$

$y = 4 - 3x$

$-(4-3x) - 2x = -5$

$-4 + 3x - 2x = -5$

$x = -1$

$y = 4 - 3(-1)$

$y = 7$

$(-1, 7)$

Solve by elimination:

14. $\begin{cases} 2x - 3y = 3 \\ (-x + 2y = -2) \cdot 2 \end{cases}$

$\begin{cases} 2x - 3y = 3 \\ -2x + 4y = -4 \end{cases}$

$+$

$y = -1$

$2x - 3(-1) = 3$

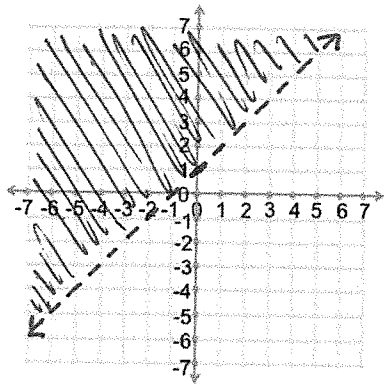
$2x = 0$

$x = 0$

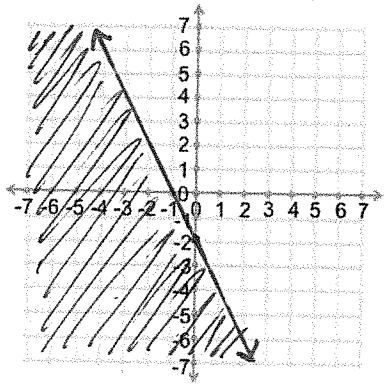
$(0, -1)$

Graph each inequality.

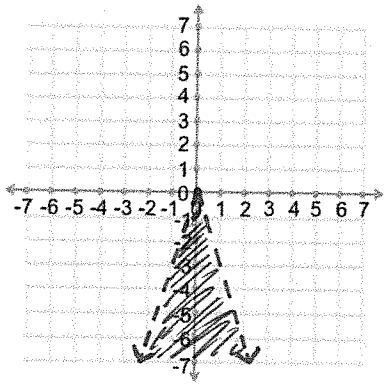
15. $y > x + 1$



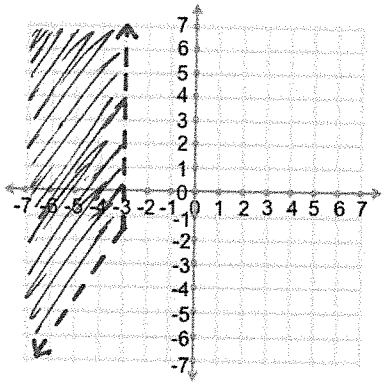
16. $-y \geq 2x + 2 \rightarrow y \leq -2x - 2$



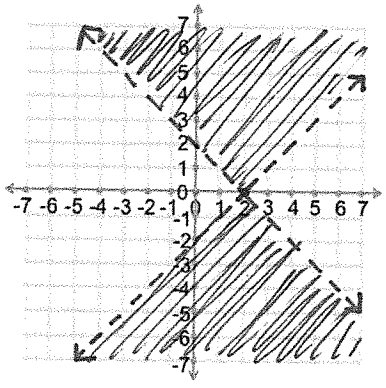
17. $y < -3|x|$



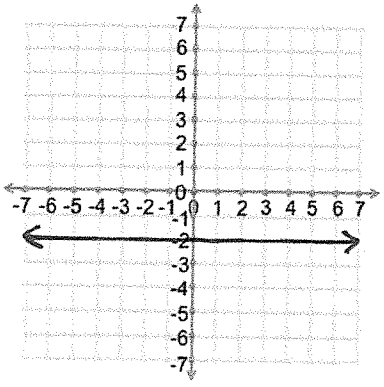
18. The intersection of
$x < -3$ and $y > \frac{3}{2}x + 3$



19. The union of
$|x - 2| < y$ and $-|x - 2| > y$



20. The intersection of
$y \geq -2$ and $y \leq -2$



Solve each system. You may use any method.

21. $\begin{cases} -2x + 2y = 4 \\ 3x - y = -10 \end{cases}$ $\cdot -2 = \begin{cases} -2x + 2y = 4 \\ 6x - 2y = -20 \end{cases}$

$+$

$4x = -16$

$x = -4$

$-2(-4) + 2y = 4$

$2y = -4$

$y = -2$

$(-4, -2)$

22. $\begin{cases} y = \frac{4}{5}x + 1 \\ 4x - 5y = -4 \end{cases}$

$4x - 5\left(\frac{4}{5}x + 1\right) = -4$

$4x - 4x - 5 = -4$

$-5 = -4$

No solution

23. $\begin{cases} y = x + 7 \\ -4x - y = 3 \end{cases}$

$-4x - (x + 7) = 3$

$-5x - 7 = 3$

$-5x = 10$

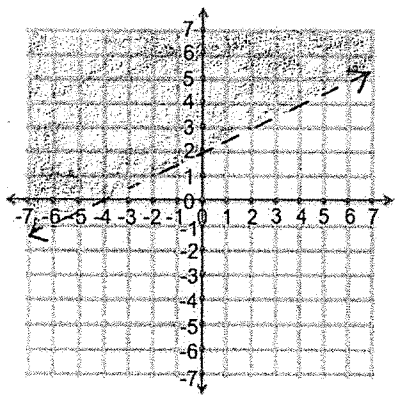
$x = -2$

$y = -2 + 7 = 5$

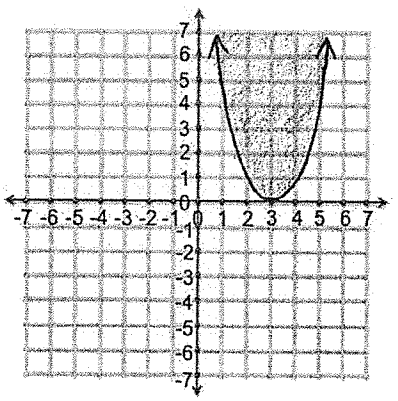
$(-2, 5)$

For questions 24 – 27, write the inequality or system of inequalities with the given solution sets. If it is a union or an intersection, be sure to state which one.

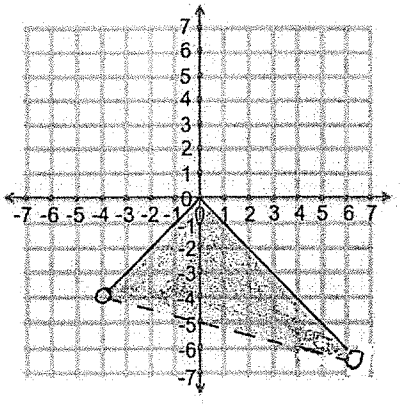
24. $y > \frac{1}{2}x + 2$



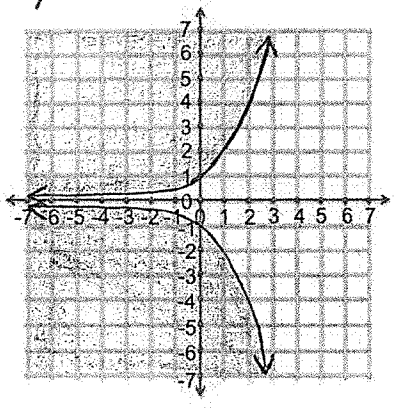
25. $y \geq (x-3)^2$



26. Intersection of $y \leq -|x|$ and $y > -\frac{1}{4}x - 5$



27. Union of $y \geq 2^x$ or $y \leq -2^x$



Determine whether each point is a solution to the system or not.

28. $\begin{cases} y \leq 4 \\ y = -x + 5 \end{cases}$ (2,4)

$4 \leq 4$ ✓

$4 = -2 + 5$

$4 = 3$ X

No

29. $\begin{cases} x = 4y - 1 \\ y = \frac{1}{3}x - 1 \end{cases}$ (3,1)

$3 = 4(1) - 1$

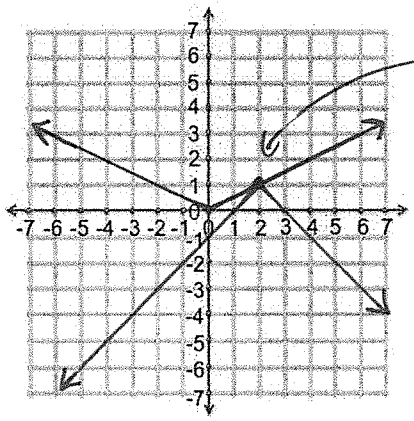
$3 = 3$ ✓

$1 = \frac{1}{3}(3) - 1$

$1 = 0$ X

No

30. Solve the system $\begin{cases} y = -|x - 2| + 1 \\ y = \frac{1}{2}|x| \end{cases}$ by graphing. List all solutions as points.



Extra credit: Let $g(x) = |x|$ and let the graph of $h(x)$ be a parabola. What are all of the different possible number of solutions to the system $\begin{cases} y = g(x) \\ y = h(x) \end{cases}$? Draw pictures to support your answer.