Systems of Equations

Find the solution to the following systems. Remember to write the solution as a point!!

1. $y + 4x = 4$
   $y + x^2 + 2x = 4$

   (0,4) (2,-4)

2. $y = |x - 3|$
   $5y + 2x = 27$

   (-4,7) (6,3)

3. $y = 2|3x - 5| - 5$
   $y = -4(x-2)^2 + 3$

   (1,-1) (2.686, 1.11

4. $y + x = -8$
   $2x + 2y = 6$

   no solution

5. $y - 4x = -6$
   $2y - 8x = -12$

   many solutions

6. $2x - 3y = 1$
   $-6x + 9y = 4$

   no solution

7. $7y - 2x = 35$
   $3y = 2x + 15$

   (0,5)

8. $x^2 + 4y^2 = 20$
   $x + 2y = 6$

   (2,2) (4,1)

9. $5x - 2y = 10$
   $3x + 2y = 6$

   (2,0)

Applications of Systems of Equations

10. A coffee merchant has two types of coffee beans, one selling for $9 per pound and the other selling for $15 per pound. The beans are to be mixed to provide 100 pounds of a mixture selling for $13.50 per pound. How much of each type of coffee bean should be used to form 100 pounds of the mixture?

    bean 1: 25
    bean 2: 75

11. Two car rental agencies have the following rate structures for a subcompact car. Urent charges $50 per day plus $.15 per mile. Painz charges $45 per day plus $.20 per mile. If you rent a car for 1 day, for what number of miles will the two companies have the same total charge?

    100 miles

12. Donald has investments totaling $8,000 in two accounts – one a savings account paying 6% interest, and the other a bond paying 9%. If the annual interest from the two investments was $6,00[illegible], how much did he have invested at each rate?

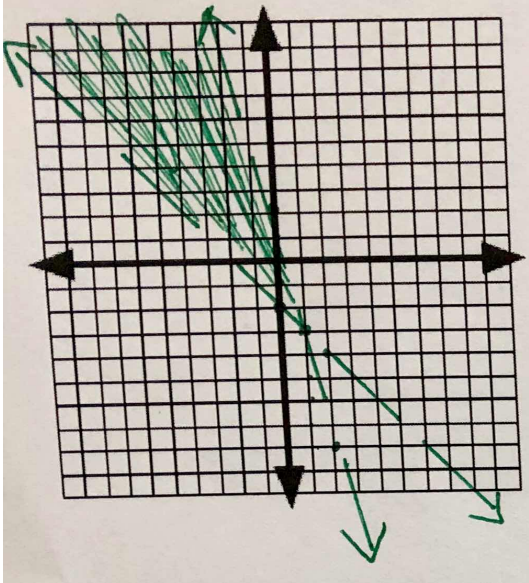
    savings: $4000
    bond: $4000

~~13.~~ A boat can travel 36 miles downstream in 2 hours. Coming back upstream, the boat takes 3 hours. What is the rate of the boat in still water? What is the rate of the current?

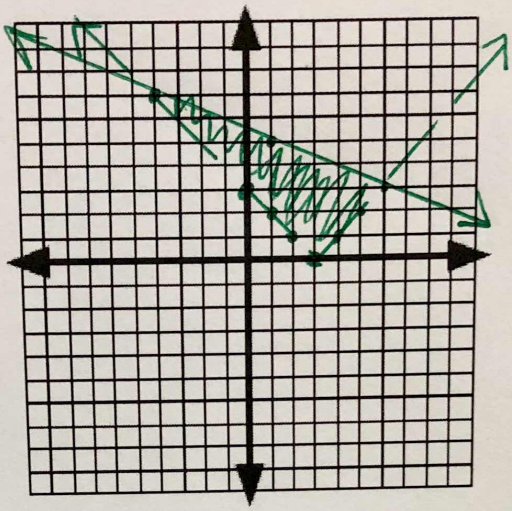
Systems of Inequalities

Solve each system of inequalities.

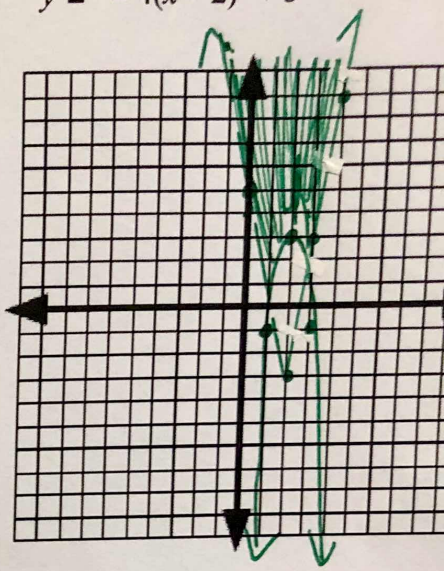
14. $y > -x - 2$
    $y < -5x + 2$



15. $y > |x - 3|$
    $-5y \geq 2x - 27$



16. $y > 2|3x - 5| - 5$
    $y \geq -4(x - 2)^2 + 3$



Applications of Systems of Inequalities

17. You can work a total of no more than 41 hours each week at your two jobs. House cleaning pays $5 per hour and your sales job pays $8 per hour. You need to earn at least $254 each week to pay your bills. Write a system of inequalities that shows the various numbers of hours you can work at each job.

$H + S \leq 41$

$5H + 8S \geq 254$

18. Tyrique's Pet Store never has more than a combined total of 16 cats and dogs. He also never has more than 9 cats. Write a system of inequalities to show the possible number of cats and dogs in his store.

$c + d \leq 16$

$c \leq 9$

19. A manufacturer of ski clothing makes ski pants and ski jackets. Both pants and jackets require the work of sewing operators and cutters. There are 60 minutes of sewing operator time and 48 minutes of cutter time available. It takes 8 minutes to sew one pair of pants and 4 minutes to sew one jacket. Cutters take 4 minutes on pants and 8 minutes on a jacket. Write a system of inequalities that shows the various numbers of hours you can work at each job.

$8p + 4j \leq 60$

$4p + 8j \leq 48$

Absolute Value Equations and Inequalities

Solve for the variable.

20 $|2+3x|=4$

$x=\frac{2}{3}$ or $x=-2$

21. $|4x-2|+6\le -20$

no solution

22. $-9|m+1|-6<93$

$m>-12$ or $m<10$

23. $|-3+6x|+10=31$

$x=4$ or $x=-3$

Function Combinations and Compositions

Given that $f(x)=2x-5$ and $g(x)=x^2-3x+6$, find the following:

24. $(f+g)(x)$

x^2-x+1

25. $(g-f)(x)$

$x^2-5x+11$

26. $(fg)(x)$

$2x^3-11x^2+27x-30$

27. $\left(\frac{f}{g}\right)(x)$

$\frac{2x-5}{x^2-3x+6}$

28. $(f+g)(2)$

3

29. $(f-g)(3)$

-5

30. $(fg)(-2)$

-144

31. $\left(\frac{g}{f}\right)(6)$

$\frac{34}{7}$

32. $(f\circ g)(3)$

7

33. $(g\circ f)(-2)$

114

34. $f(g(x))$

$2x^2-6x+7$

35. $g(f(x))$

$4x^2-26x+46$

36. Prove that $a(x)=\frac{7x+3}{8}$ and $b(x)=\frac{8x-3}{7}$ are inverses.

37. Prove that $c(x)=\sqrt[3]{4x}+1$ and $d(x)=\frac{(x-1)^3}{4}$ are inverses.

raphing Inverses

38. $\{(-5, 6), (0, -1), (7, 4)\}$

D: $-5, 0, 7$ R: $6, -1, 4$

$f^{-1}(x) = \{(6, -5), (-1, 0), (4, 7)\}$

D of $f^{-1}(x)$: $6, -1, 4$

R of $f^{-1}(x)$: $-5, 0, 7$

Function? (yes)/no

39. $f(x) = 4x - 16$

D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

$f^{-1}(x) = \frac{x+16}{4}$

D of $f^{-1}(x)$: $(-\infty, \infty)$

R of $f^{-1}(x)$: $(-\infty, \infty)$

Function? (yes)/no

40. $f(x) = \sqrt{x - 8}$

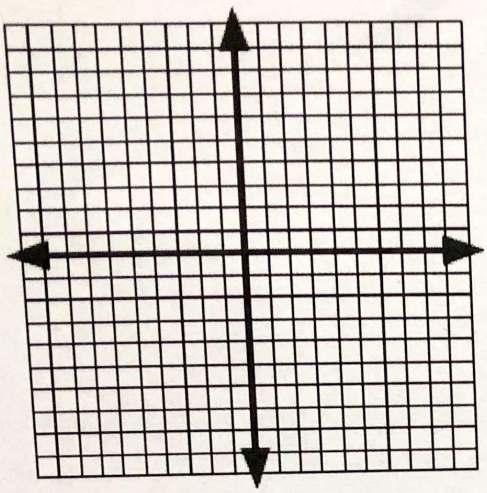
D: $[8, \infty)$ R: $[0, \infty)$

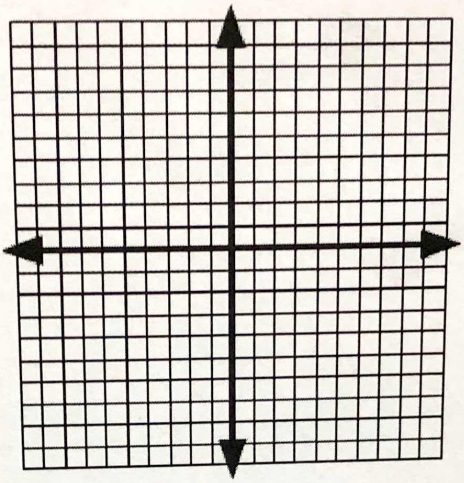
$f^{-1}(x) = x^2 + 8$

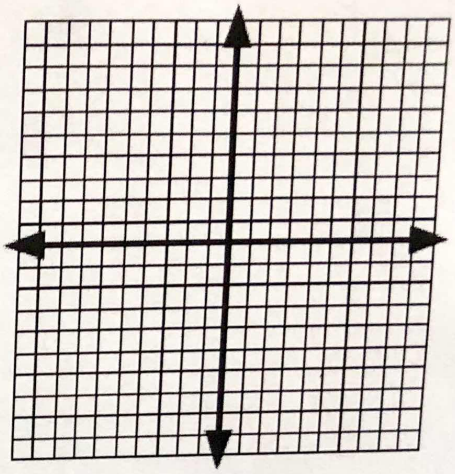
D of $f^{-1}(x)$: $[0, \infty)$

R of $f^{-1}(x)$: $[8, \infty)$

Function? (yes)/no







41. $f(x) = 5x^3 - 7$

D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

$f^{-1}(x) = \frac{\sqrt[3]{x+7}}{5}$

D of $f^{-1}(x)$: $(-\infty, \infty)$

R of $f^{-1}(x)$: $(-\infty, \infty)$

Function? (yes)/no

42. $f(x) = (3x - 11)^2$

D: $(-\infty, \infty)$ R: $[0, \infty)$

$f^{-1}(x) = \frac{\sqrt{x}+11}{3}$

D of $f^{-1}(x)$: $[0, \infty)$

R of $f^{-1}(x)$: $(-\infty, \infty)$

Function? yes/no

43. $f(x) = \frac{5x+6}{3}$

D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

$f^{-1}(x) = \frac{3x-6}{5}$

D of $f^{-1}(x)$: $(-\infty, \infty)$

R of $f^{-1}(x)$: $(-\infty, \infty)$

Function? (yes)/no