Unit 1 Test Review

Systems of Equations

Find the solution to the following systems:

1. $y+4x=4$ (0,4)
   $y+x^2+2x=4$ (2,-4)

2. $y=|x-3|$ (-4,7)
   $5y+2x=27$ (6,3)

3. $y=2|3x-5|-5$ (1,-1)
   $y=-4(x-2)^2+3$ (2.691,1.62)

4. $y+x=-8$ no solution
   $2x+2y=6$

5. $3x+2y=6$
   $2x-4y=-12$ (0,3)

6. $2x-3y=1$ (.93,1.07)
   $-6x+9y=4$

7. $7y-2x=35$
   $3y=2x+15$ (0,5)

8. $x^2+4y^2=20$ $y=\pm\sqrt{\frac{20-x^2}{4}}$
   $x+2y=6$ $y=\frac{6-x}{2}$ (8) (4,1) and (2,2)

9. $5x-2y=10$ (2,0)
   $3x+2y=6$

10. $y-4x=-6$ Infinitely many solutions
    $2y-8x=-12$

11. $\frac{1}{2}x+7=3$ $x=-8$
    $-x+2y=-6$ $y=\frac{1}{2}x-3$
    (-8,-7)

12. $-5m+9n=21$ (-10.5,-3.5)
    $2m+2n=14$

Applications of Systems of Equations

13. 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?

x = bean 1
y = bean 2

$9x+15y=1350$
$x+y=100$

$6y=450$
$y=75$ $x=25$

14. 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?

b = boat
c = current

$2(b+c)=36$
$3(b-c)=36$

$2b+2c=3b-3c$

$2b+2c=36$
$3b-3c=36$
$12b=180$ $b=15$ $c=3$

15. 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?

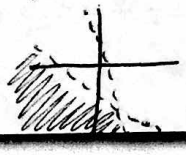
m = miles

$50+.15m=45+.2m$ $5=.05m$ $m=100$ miles

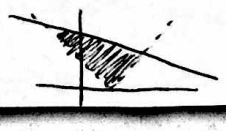
16. Donald has investments totaling \$8,000 in two accounts – one a savings account paying 6% interest, and the other a bond paying 9%. If the annual interest from the two investments was \$6,000, how much did he have invested at each rate?

Systems of Inequations

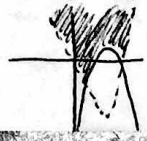
17. $y>-x-2$
    $y<-5x+2$



18. $y>|x-3|$
    $y\leq\frac{-2x+27}{5}$



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



Applications of Systems of Inequalities

20. You can work a total of no more than 41 hours each week at your two jobs. Housecleaning 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. $5H + 8S \geq 254$, $H + S \leq 41$

21. Fuel x costs \$2 per gallon and fuel y costs \$3 per gallon. You have at most \$18 to spend on fuel. Write and graph a system of linear inequalities to represent this situation. $2x + 3y \leq 18$

22. A salad contains ham and chicken. There are at most 6 pounds of ham and chicken in the salad. Write and graph a system of inequalities to represent this situation. $h + c \leq 6$

Absolute Value Equations and Inequalities

Solve the following:

23. $|2 + 3x| = 4$ → $2+3x=4$ or $2+3x=-4$; $x = 2/3$ or $x = -2$

24. $|4x - 2| + 6 \leq -20$ → $|4x-2| \leq -26$ can't be! NO solution

25. $-9|m + 1| - 6 < 93$ → $|m+1| > -11$ yes; $m+1 > -11$ or $m+1 < 11$; $m > -12$ or $m < 10$

26. $|-3 + 6x| + 10 = 31$ → $-3+6x = 21$ or $-3+6x = -21$; $6x = 24$, $x = 4$; $6x = -18$, $x = -3$

Applications of Compositions

27. You work forty hours a week at a furniture store. You receive a \$720 weekly salary, plus a 3% commission on sales over \$5000. Assume that you sell enough this week to get the commission. Given the functions $f(x) = 0.03x$ (commission) and $g(x) = x - 5000$ . . . ← to determine if sales > 5000

    a. Which of $(f \circ g)(x)$ or $(g \circ f)(x)$ represents your commission?

    b. How much will your salary be if your sales were \$14,000? $.03(14{,}000 - 5000) = \$270 + \$720$ salary $= \$990$

    c. How much will your salary be if your sales were \$4999? no commission. so just \$720

M2: $y = \frac{1}{x-h} + k$

Function Combinations and Compositions

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

28. $(f+g)(x)$ x^2-x+1

29. $(g-f)(x)$ $x^2-5x+11$

30. $(fg)(x)$ $(2x-5)(x^2-3x+6) = 2x^3-11x^2+27x-30$

31. $\left(\frac{f}{g}\right)(x)$ $\frac{2x-5}{x^2-3x+6}$

32. $(f+g)(2) = 2^2-2+1 = 3$

33. $(f-g)(3)$ $1-6 = -5$

34. $(fg)(-2) = -144$

35. $\left(\frac{g}{f}\right)(6)$ $\frac{36-8+6}{7} = \frac{34}{7}$

36. $(f \circ g)(3)$ $= 7$

37. $(g \circ f)(-2)$ $= 16 - 26(-2) + 46 = 114$

38. $f(g(x)) = 2(x^2-3x+6)-5 = 2x^2-6x+7$

39. $g(f(x))$ $(2x-5)^2-3(2x-5)+6$ $4x^2-20x+25-6x+21$ $4x^2-26x+46$

Graphing Inverses

40. $\{(-5,6),(0,-1),(7,4)\}$

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

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

D: $\mathbb{R}$ $(-\infty, \infty)$ R: $\mathbb{R}$ all real numbers

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

D of $f^{-1}(x)$: $\mathbb{R}$

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

Function? yes/no

42. $f(x) = \frac{7x+5}{2x-9}$ Ewww

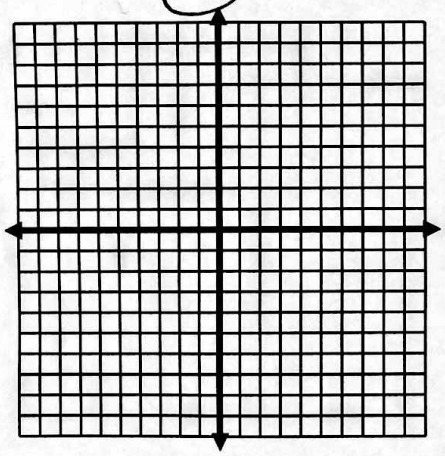
D: $x \neq 4.5$ R: $y \neq 3.5$

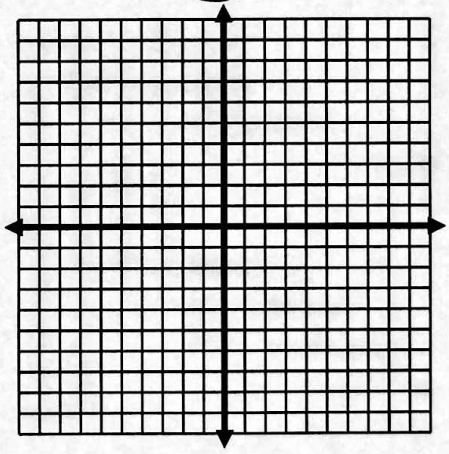
$f^{-1}(x) =$

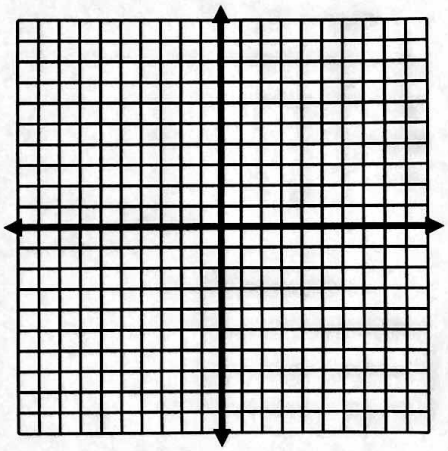
D of $f^{-1}(x)$:

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

Function? yes/no







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

D: $\mathbb{R}$ R: $\mathbb{R}$

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

D of $f^{-1}(x)$: $\mathbb{R}$

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

Function? yes/no

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

D: $\mathbb{R}$ R: $y \geq 0$

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

D of $f^{-1}(x)$: $x \geq 0$

R of $f^{-1}(x)$: $\mathbb{R}$ ★

Function? ~~yes~~/no

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

D: $\mathbb{R}$ R: $\mathbb{R}$

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

D of $f^{-1}(x)$: $\mathbb{R}$

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

Function? yes/no