

Math 3 ~ Unit 1: Functions & Their Inverses Test Review!

Section #1: Find the appropriate solution for the assigned function(s)

$$f(x) = 3x - 8 \text{ and } g(x) = -2x^2 + 5x - 7$$

1. $f(0) = \boxed{-8}$

$$-2(1)^2 + 5(1) - 7$$

2. $f(g(2)) = \boxed{-23}$

$$-2 + 5 - 7$$

3. $2[f(2) - g(1)] = 2(-2 + 4) = \boxed{4}$

4. $f(g(x)) = 3(-2x^2 + 5x - 7) - 8 = \boxed{-6x^2 + 15x - 29}$

~~5. $f(x) - g(x)$~~

~~6. $f(2x) - g(x)$~~

Section #2: Find the solution(s) to the following system.

7. $y = -4x + 4$
 $y = -x^2 - 2x + 4$

Solutions: $\underline{(0, 4) \text{ and } (2, -4)}$

look at graph

8. $y = |x - 3|$
 $y = \frac{-2}{5}x + \frac{27}{5}$

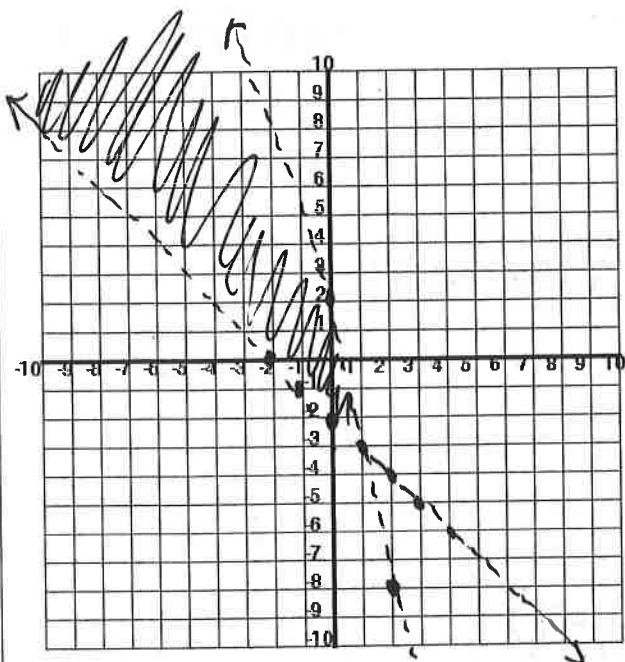
Solutions: $\underline{(-4, 7) \text{ and } (6, 3)}$

look at graph

Please study your NOTES and Quizzes from this Unit before tomorrow's test!!

Section #3 Sketch the solution for each inequality.

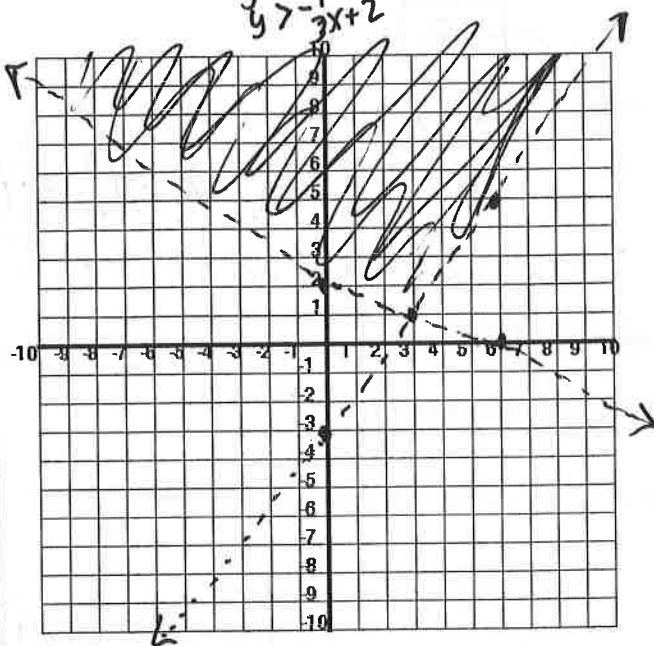
9. $y > -x - 2$
 $y < -5x + 2$



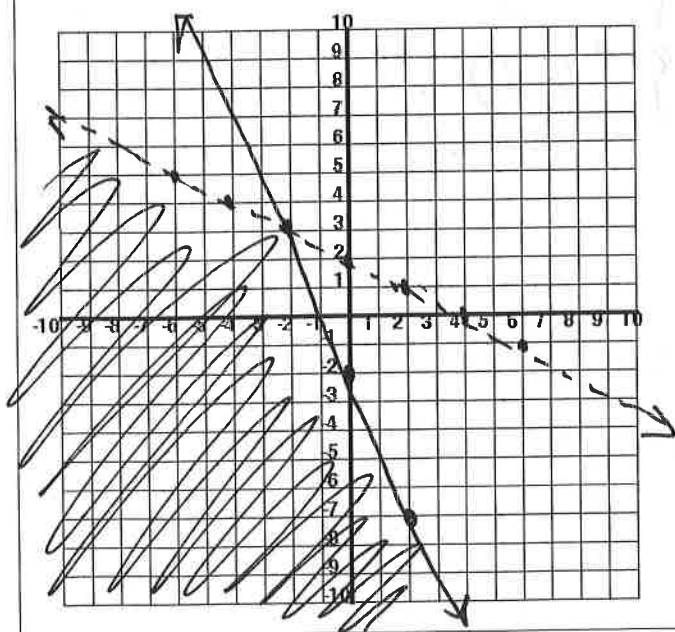
10.

$4x - 3y < 9$
 $x + 3y > 6$

Handwritten work:
 $-3y < -4x + 9$
 $y > \frac{4}{3}x - 3$
 $3y > -1x + 6$
 $y > -\frac{1}{3}x + 2$



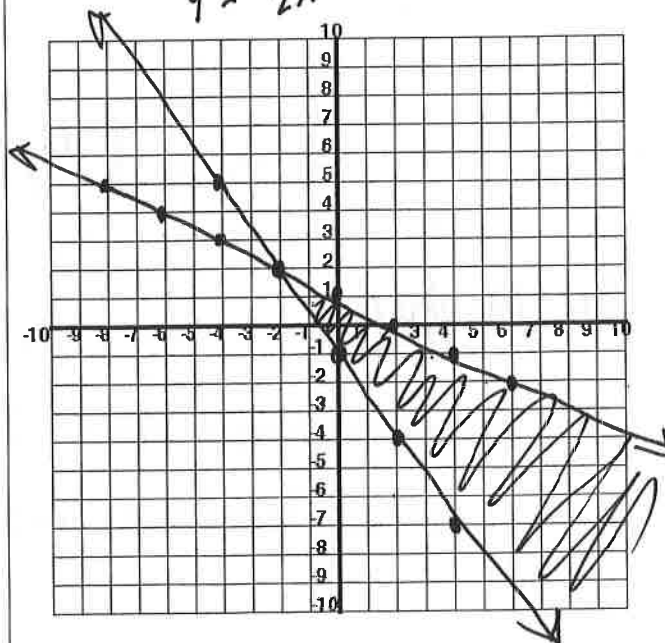
11. $y \leq \frac{-5}{2}x - 2$
 $y < \frac{-1}{2}x + 2$



12.

$3x + 2y \geq -2$
 $x + 2y \leq 2$

Handwritten work:
 $2y \geq -3x - 2$
 $y \geq -\frac{3}{2}x - 1$
 $2y \leq -x + 2$
 $y \leq -\frac{1}{2}x + 1$



Section #4: Solve the systems of linear equations through graphing, substitution, or elimination. Use method indicated if possible.

13. The equations $8x + 4y = 28$ and $-9x + 9y = 36$ represents the amount of money collected from the Stone Creek Movie Theater. If "y" represents the cost of an adult ticket to get into the movie and "x" represents the cost of a child ticket to get into a movie then what is the cost of each adult ticket? Use any method! ☺

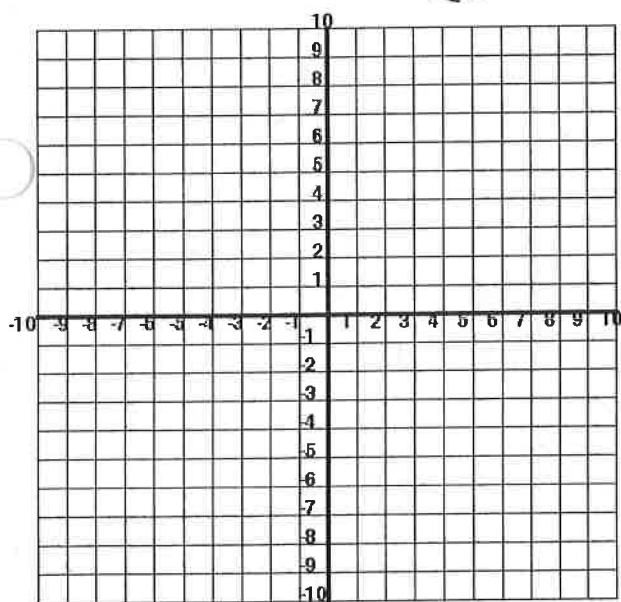
$$\begin{aligned} 8x + 4y &= 28 \\ -9x + 9y &= 36 \end{aligned}$$

Child \$1
Adult \$5

METHOD 1: GRAPHING

14. $x + 4y = -8$
 $3x + 2y = 6$

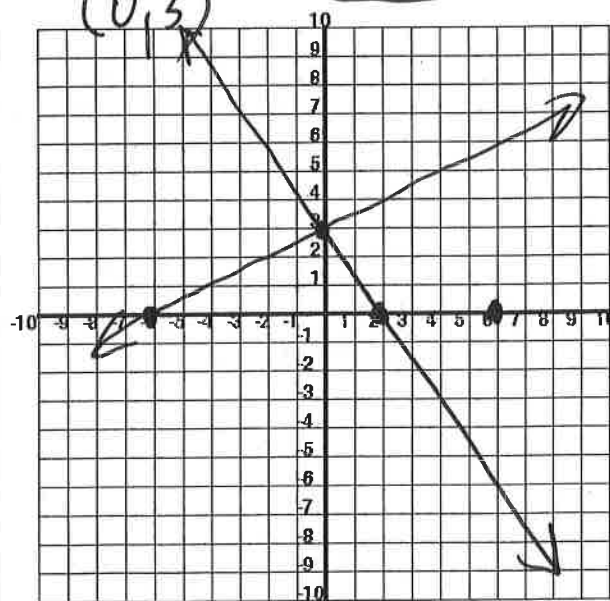
$(4, -3)$



15. $3x + 2y = 6$
 $2x - 4y = -12$

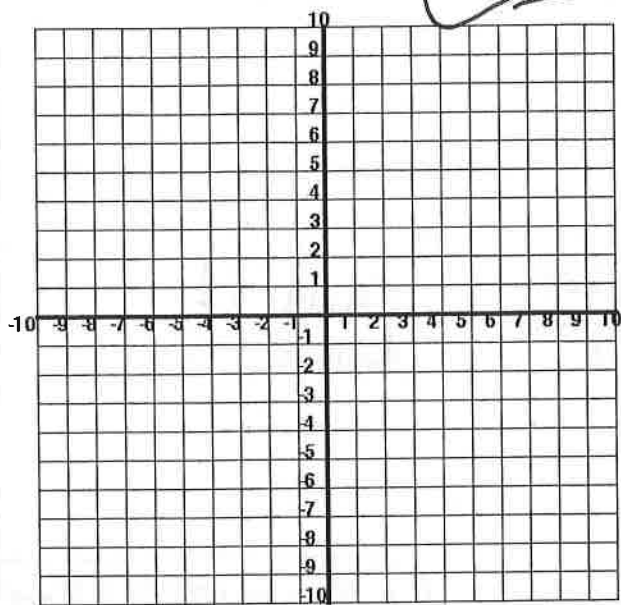
$(0, 3)$

Infinitely many solutions



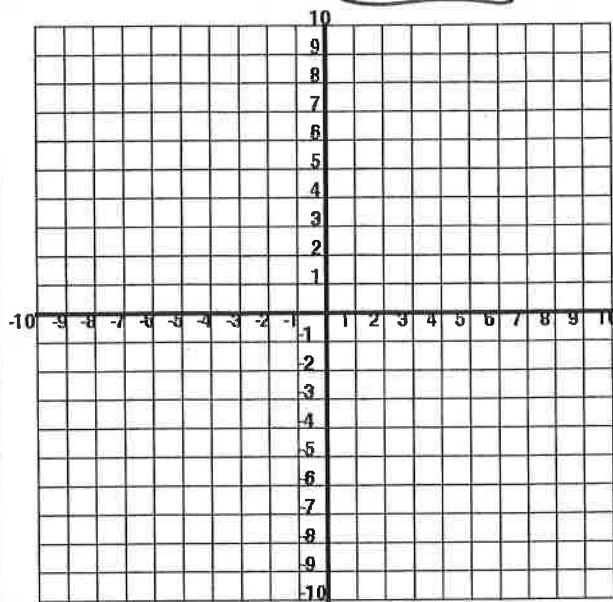
16. $x - y = 5$
 $3x + y = 3$

$(2, -3)$



17. $7y = 2x + 35$
 $3y = 2x + 15$

$(0, 5)$



METHOD 2: Elimination

18. $4x - 5y = 17$
 $3x + 4y = 5$

$(3, -1)$

19. $5x - 2y = 10$
 $3x + 2y = 6$

$(2, 0)$

20. $2y - 4x = -6$
 $2y - 8x = -12$

$(1.5, 0)$

21. $\frac{1}{2}x + y = 3$
 $-x + 2y = -6$

$(6, 0)$

Method 3: Substitution

2. $x - y = 1$
 $x + 2y = 7$

$(3, 2)$

23. $-5m + 9n = 21$
 $2m + 2n = 14$

$(3, 4)$

Section #5: Evaluate each piece-wise function for its given domain.

24. $f(x) = \begin{cases} 2x + 1 & x \geq 1 \\ x^2 + 3 & x < 1 \end{cases}$

$f(-10) = \cancel{2(-10) + 1} = (-10)^2 + 3 = 103$

$f(-2) = 7$

$f(6) = 13$

$f(1) = 3$

25. $f(x) = \begin{cases} x^2 - 1 & x \leq 0 \\ 2x - 1 & 0 < x \leq 5 \\ 3 & x > 5 \end{cases}$

$f(-2) = 3$

$f(0) = -1$

$f(5) = 9$

$f(7) = 3$

26. Looking at #24 find: $2f(1) - 3(f(-3) + f(0))$

$2(3) - 3(12 + 3) = 6 - 45 = -39$

Section #6: For each equation state the domain and range (using interval notation) then find the inverse and state the domain and range of the inverse. Also, determine if the inverse is a function.

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

Domain: _____ Range: _____

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

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

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

28. $f(x) = -5x - 11$

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

$x = -5y - 11$
 $f^{-1}(x) = \frac{x + 11}{-5}$ $y^{-1} = \frac{x + 11}{-5}$

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

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

29. $f(x) = 3x^2 - 1$

Domain: $(-\infty, \infty)$ Range: $[-1, \infty)$

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

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

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

30. $f(x) = \sqrt{x-4}$

Domain: $[4, \infty)$ Range: $[0, \infty)$

$f^{-1}(x) = x^2 + 4$

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

Range of $f^{-1}(x)$: $[4, \infty)$

Section #7 Absolute Value Equations & Functions

31. Solve each of the following.

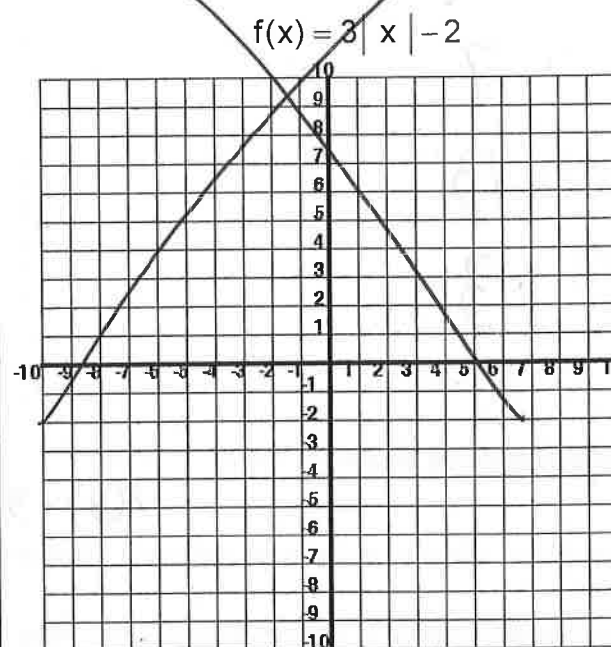
a. $|x-1| < 4$

b. $3 + |y| \leq 5$

c. $|2+3d| \geq 4$

d. $|2m-1| > 2$

32. Graph the following equation. Then describe the translate of $g(x) = |x|$ to $f(x)$.



33. Determine whether each of the following is a function. Justify your answer. Find the Domain and Range of each.

a. $f(x) = \sqrt{x-3}$

b. $f(x) = -x^2 + 2x - 27$

34. 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 $f(x) = 0.03x$ and $g(x) = x - 5000$, which of $(f \circ g)(x)$ and $(g \circ f)(x)$ represents your commission? Also, how much will your salary be if your sales were \$14,000? How much will your salary be if your sales were \$4999?