

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. $f(0) = -8$

3. $2[f(2) - g(1)]$

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

4

$$2x^2 - 2x - 1$$

2. $f(g(2))$

4. $f(g(x))$

6. $f(2z) + g(z)$

-23

$$-6x^2 + 15x - 29$$

$$-2z^2 + 11z - 15$$

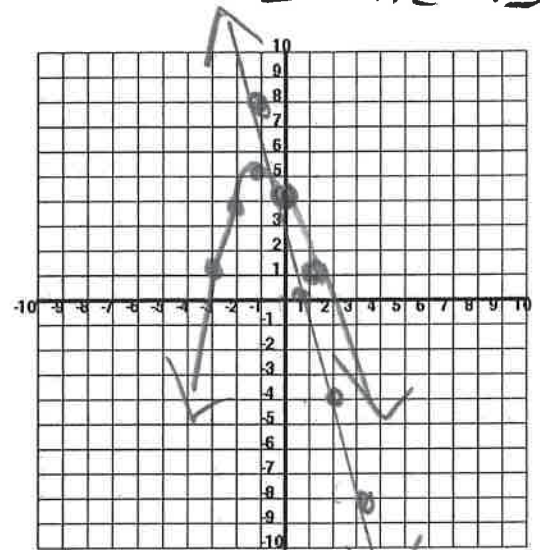
Section #2: Find the solution(s) to the following system.

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

Solutions: (0, 4)

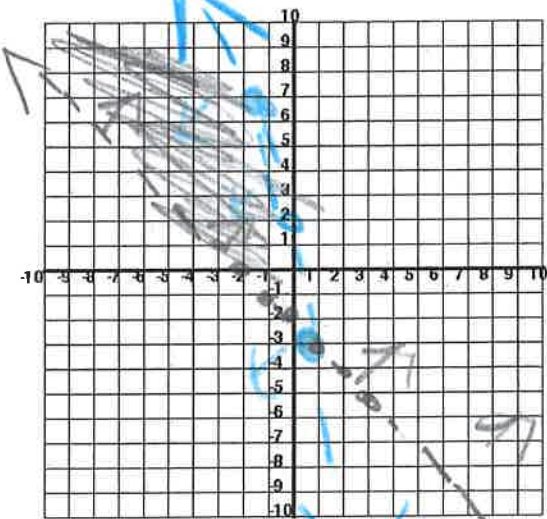
x	y
-2	4
-1	3
0	4
1	3

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

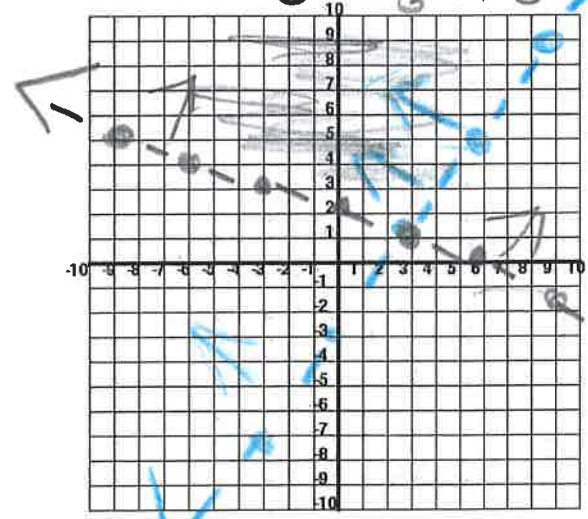


Section #3 Sketch the solution for each inequality.

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



9. $4x - 3y < 9 \rightarrow y > \frac{4}{3}x - 3$
 $x + 3y > 6 \rightarrow y > -\frac{1}{3}x + 2$



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

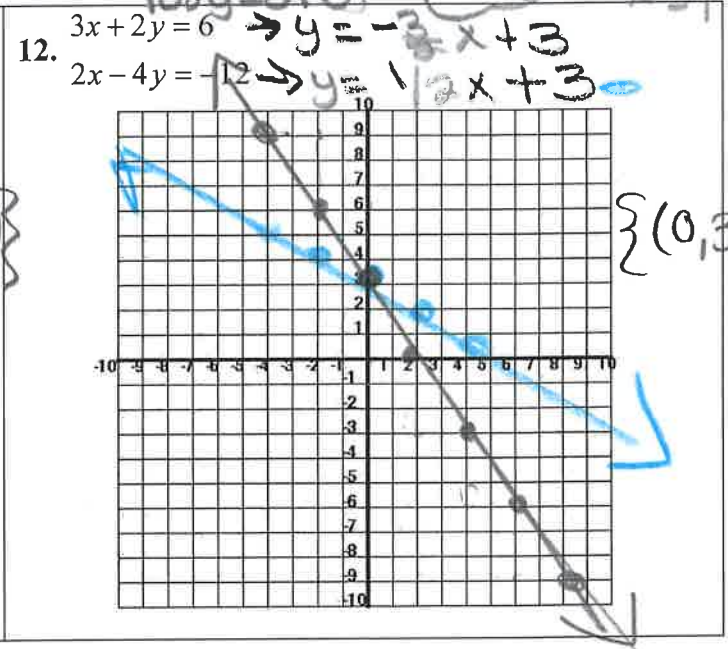
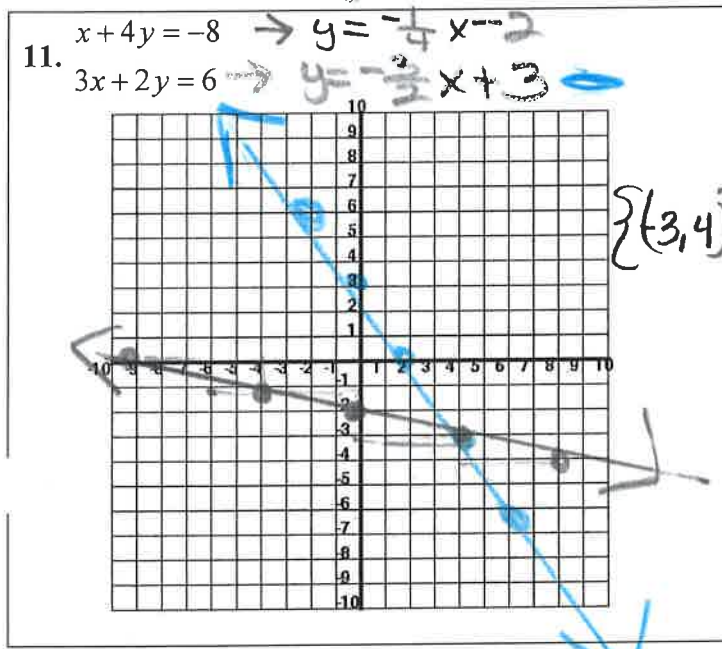
10. The equations $8x + 4y = 28$ and $-9x + 9y = 36$ represents the amount of money collected from the Stone Creek Movie Theater. If "y" represents the cost of an adult ticket to get into the movie and "x" represents the cost of a child ticket to get into a movie then what is the cost of each adult ticket?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

METHOD 1: GRAPHING

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

$$\begin{aligned} 12x + 36y &= 252 \\ -12x + 72y &= -252 \\ \hline 108y &= 540 \end{aligned}$$

$$\begin{aligned} y &= 5 \\ 8x + 4(5) &= 28 \\ 8x + 20 &= 28 \\ 8x &= 8 \\ x &= 1 \end{aligned}$$



METHOD 2: Elimination

13. $4x - 5y = 17$
 $3x + 4y = 5$

$$\{(3, -1)\}$$

14. $5x - 2y = 10$
 $3x + 2y = 6$

$$\{(2, 0)\}$$

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Method 3: Substitution

<p>15. $x - y = 1$ $x + 2y = 7$</p> <p style="text-align: center;">$\{(3, 2)\}$</p>	<p>16. $m + n = 7$ $-5m + 9n = 21$</p> <p style="text-align: center;">$\{(3, 4)\}$</p>
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Section #5: Evaluate each piece-wise function for its given domain.

<p>17. $f(x) = \begin{cases} 2x + 1 & x \geq 1 \\ x^2 + 3 & x < 1 \end{cases}$</p> <p>$f(-10) = (-10)^2 + 3 = 103$</p> <p>$f(-2) = (-2)^2 + 3 = 7$</p> <p>$f(6) = 2(6) + 1 = 13$</p> <p>$f(1) = 2(1) + 1 = 3$</p>	<p>18. $f(x) = \begin{cases} x^2 - 1 & x \leq 0 \\ 2x - 1 & 0 < x \leq 5 \\ 3 & x > 5 \end{cases}$</p> <p>$f(-2) = (-2)^2 - 1 = 3$</p> <p>$f(0) = 0^2 - 1 = -1$</p> <p>$f(5) = 2(5) - 1 = 9$</p> <p>$f(7) = 3$</p>
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19. Looking at #17 find: $2f(1) - 3(f(-3) + f(0))$

$f(1) = 3$

$f(-3) = (-3)^2 + 3 = 12$

$f(0) = 0^2 + 3 = 3$

$2(3 - 3(12 + 3)) = -60$

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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.

<p>20. $f(x) = 5x^3 - 7$</p> <p>Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$</p> <p>$f^{-1}(x) = \sqrt[3]{\frac{x+7}{5}}$</p> <p>Domain of $f^{-1}(x)$: $(-\infty, \infty)$</p> <p>Range of $f^{-1}(x)$: $(-\infty, \infty)$</p>	<p>21. $f(x) = -5x - 11$</p> <p>Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$</p> <p>$f^{-1}(x) = \frac{x+11}{-5}$</p> <p>Domain of $f^{-1}(x)$: $(-\infty, \infty)$</p> <p>Range of $f^{-1}(x)$: $(-\infty, \infty)$</p>
<p>22. $f(x) = 3x^2 - 1$</p> <p>Domain: $(-\infty, \infty)$ Range: $[-1, \infty)$</p> <p>$f^{-1}(x) = \pm \sqrt{\frac{x+1}{3}}$</p> <p>Domain of $f^{-1}(x)$: $[-1, \infty)$</p> <p>Range of $f^{-1}(x)$: $(-\infty, \infty)$</p>	<p>23. $f(x) = \sqrt{x-4}$</p> <p>Domain: $[4, \infty)$ Range: $[0, \infty)$</p> <p>$f^{-1}(x) = x^2 + 4$</p> <p>Domain of $f^{-1}(x)$: $[0, \infty)$</p> <p>Range of $f^{-1}(x)$: $[4, \infty)$</p>

Section #7 Absolute Value Equations & Functions

<p>24. Solve each of the following.</p> <p>a. $x - 1 < 4$</p> <p>b. $3 + y \leq 5$</p> <p>c. $2 + 3d = 4$</p> <p>d. $2m - 1 > 4$</p> <p style="font-size: 1.5em; margin-top: 20px;">* Do on notebook paper!</p>	<p>25. Graph the following equation. Then describe how to translate the graph of $g(x) = x$ to get the graph of $f(x)$.</p> <p style="text-align: center;">$f(x) = 3 x - 2$</p> <div style="text-align: center;"> </div> <p style="font-size: 1.5em; margin-top: 10px;">Stretch by 3 down 2</p>
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Unit 1 Review

① $f(0)$
 $3(0) - 8$
 -8

② $2 [f(2) - g(1)]$
 $2 [(3(2) - 8) - (-2(1)^2 + 5(1) - 7)]$
 $2 [-2 - (-4)]$
 $2(2)$
 4

③ $f(g(2))$
 $f(-5)$
 $3(-5) - 8$
 $-15 - 8$
 -23

$g(2) = -2(2)^2 + 5(2) - 7$
 $= -8 + 10 - 7$
 $= -5$

④ $f(g(x))$
 $f(-2x^2 + 5x - 7)$
 $3(-2x^2 + 5x - 7) - 8$
 $-6x^2 + 15x - 21 - 8$
 $-6x^2 + 15x - 29$

⑤ $f(x) - g(x)$
 $3x - 8 - (-2x^2 + 5x - 7)$
 $3x - 8 + 2x^2 - 5x + 7$
 $2x^2 - 2x - 1$

⑥ $f(2z) + g(z)$
 $3(2z) - 8 + (-2(z)^2 + 5(z) - 7)$
 $6z - 8 - 2z^2 + 5z - 7$
 $-2z^2 + 11z - 15$

⑦ $(4x - 5y = 17)$
 $5(3x + 4y = 5)$

$16x - 20y = 68$
 $15x + 20y = 25$
 $31x = 93$
 $x = 3$

$\{(3, -1)\}$

$3(3) + 4y = 5$
 $9 + 4y = 5$
 $4y = -4$
 $y = -1$

$$\textcircled{14} \quad \begin{array}{l} 5x - 2y = 10 \\ \underline{3x + 2y = 6} \end{array}$$

$$\begin{array}{l} 8x = 16 \\ x = 2 \end{array}$$

$$\begin{array}{l} 3(2) + 2y = 6 \\ 6 + 2y = 6 \\ 2y = 0 \\ y = 0 \end{array}$$

$$\{(2, 0)\}$$

$$\textcircled{15} \quad \begin{array}{l} x - y = 1 \rightarrow x = y + 1 \\ x + 2y = 7 \end{array}$$

$$y + 1 + 2y = 7$$

$$3y + 1 = 7$$

$$3y = 6$$

$$y = 2$$

$$x + 2(2) = 7$$

$$x + 4 = 7$$

$$x = 3$$

$$\{(3, 2)\}$$

$$\textcircled{16} \quad m + n = 7 \rightarrow m = -n + 7$$

$$-5m + 9n = 21$$

$$-5(-n + 7) + 9n = 21$$

$$5n - 35 + 9n = 21$$

$$14n - 35 = 21$$

$$14n = 56$$

$$n = 4$$

$$m + 4 = 7$$

$$m = 3$$


$$\{(3, 4)\}$$

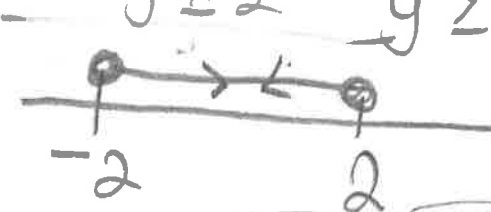
$$\begin{aligned} \textcircled{20} \quad y &= 5x^3 - 7 \\ x &= 5y^3 - 7 \\ x + 7 &= 5y^3 \\ \frac{x+7}{5} &= y^3 \\ \sqrt[3]{\frac{x+7}{5}} &= y^{-1} \end{aligned}$$

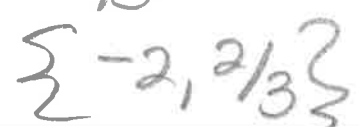
$$\begin{aligned} \textcircled{21} \quad y &= -5x - 11 \\ x &= -5y - 11 \\ x + 11 &= -5y \\ \frac{x+11}{-5} &= y^{-1} \text{ or } y^{-1} = -\frac{1}{5}x - \frac{11}{5} \end{aligned}$$

$$\begin{aligned} \textcircled{23} \quad y &= 3x^2 - 1 \\ x &= 3y^2 - 1 \\ x + 1 &= 3y^2 \\ \frac{x+1}{3} &= y^2 \\ \pm \sqrt{\frac{x+1}{3}} &= y^{-1} \end{aligned}$$

$$\begin{aligned} y &= \sqrt{x-4} \\ x &= \sqrt{y-4} \\ x^2 &= y-4 \\ x^2 + 4 &= y^{-1} \end{aligned}$$

$$\begin{aligned} \textcircled{24} \quad a \quad |x-1| &< 4 \\ x-1 &< 4 \quad x-1 > -4 \\ x &< 5 \quad x > -3 \end{aligned}$$


$$\begin{aligned} \textcircled{24} \quad b) \quad 3+|y| &\leq 5 \\ |y| &\leq 2 \\ y &\leq 2 \quad y \geq -2 \end{aligned}$$


$$\begin{aligned} c. \quad |2+3d| &= 4 \\ 2+3d &= 4 \quad 2+3d = -4 \\ 3d &= 2 \quad 3d = -6 \\ d &= 2/3 \quad d = -2 \end{aligned}$$


$$\begin{aligned} d. \quad |2m-1| &> 4 \\ 2m-1 &> 4 \quad 2m-1 < -4 \\ 2m &> 5 \quad 2m < -3 \\ m &> 5/2 \quad m < -3/2 \end{aligned}$$
