INTERMEDIATE ALGEBRA/MATH 64

SHANNON GRACEY

EXAM 1/CHAPTERS 8.1-8.4, 9.1-9.3

- *100 POINTS POSSIBLE*
- *YOUR WORK MUST SUPPORT YOUR ANSWER FOR FULL CREDIT TO BE AWARDED*
- *NO GRAPHING CALCULATOR IS PERMITTED*
- *PROVIDE EXACT ANSWERS (NO DECIMALS PLEASE)*

ONCE YOU BEGIN THE EXAM, YOU MAY NOT LEAVE THE PROCTORING CENTER UNTIL YOU ARE FINISHED. THIS MEANS NO BATHROOM BREAKS…

NAME Key

EXAM SCORE_____**EXAM PERCENTAGE**_____

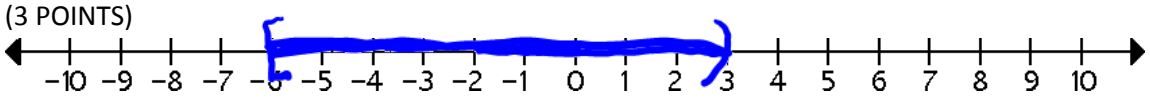
GOOD LUCK☺

1. (6 POINTS) Express the interval in set-builder notation and graph the solution set on the number line.

   $[-6,3)$

   (3 POINTS) The solution in set-builder notation is : $-6 \le x < 3$

   (3 POINTS)



2. (6 POINTS) For the pair of functions, f and g, determine the domain of $f+g$.

   $f(x)=4x-1$ and $g(x)=\dfrac{1}{x-2}$

   $x-2 \neq 0 \rightarrow x \neq 2$

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

   Domain of g: $(-\infty,2)\cup(2,\infty)$

   Domain in interval notation: $(-\infty,2)\cup(2,\infty)$

3. (8 POINTS) The function below is defined by two equations. The equation in the first row gives the output for negative numbers in the domain. The equation in the second row gives the output for nonnegative numbers in the domain. Find the indicated function values.

   $f(-1) = -(-1)+5 = 6$ $\quad f(6) = 9(6)-2 = 52$

   $f(0) = 9(0)-2 = -2$

$$f(x)=\begin{cases} -x+5 & \text{if } x<0 \\ 9x-2 & \text{if } x\ge 0 \end{cases}$$

   a. $f(-1)=$ 6

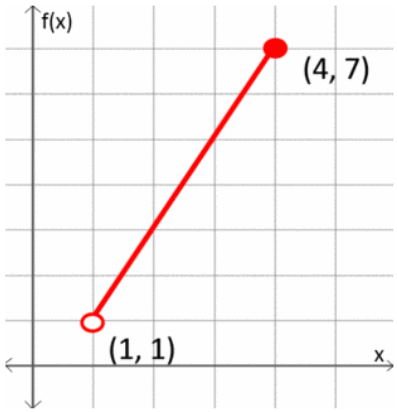
   b. $f(0)=$ -2

   c. $f(6)=$ 52

   d. $f(-1)+f(6)=$ $6+52=58$

4. (8 POINTS) Use the graph to find the domain and range of the relation.

   Use the graph of the function to identify its domain and its range.



   Domain in interval notation: $(1,4]$

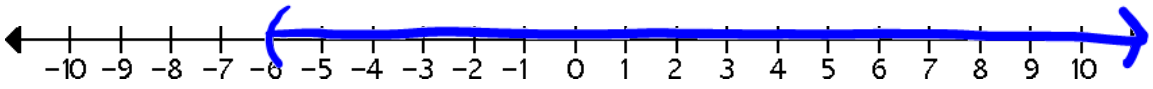
   Range in interval notation: $(1,7]$

5. (8 POINTS) Consider the compound inequality $3x < 7x + 24$ and $5x > 7x + 6$. Use graphs to show the solution set to each of the two given inequalities, as well as a third graph that shows the solution set of the compound inequality. Except for the empty set, express the solution set in interval notation.

   a. (3 POINTS) Solve the inequality and graph the solution set of $3x < 7x + 24$.

$-7x \quad -7x$
$-4x < 24$
$-4 \quad -4$
$x > -6$

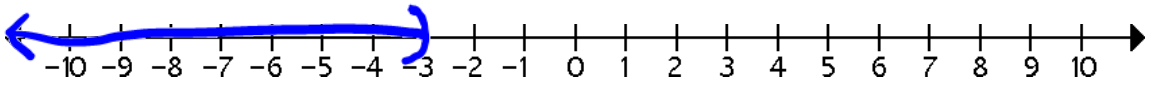
$(-6, \infty)$



   b. (3 POINTS) Solve the inequality and graph the solution set of $5x > 7x + 6$.

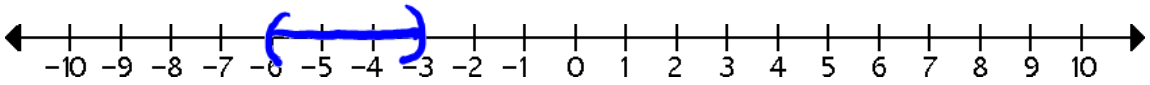
$-7x \quad -7x$
$-2x > 6$
$-2 \quad -2$
$x < -3$

$(-\infty, -3)$



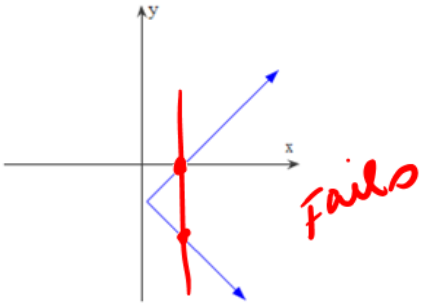
   c. (2 POINTS) Graph the solution set of the compound inequality $3x < 7x + 24$ and $5x > 7x + 6$.

$(-6, -3)$



6. (2 POINTS) Use the vertical line test to determine if y is a function of x in the given graph.
   Is y a function of x? Circle one response:

   Yes (No)



7. (9 POINTS) Consider $f(x)=4x$ and $g(x)=\frac{x}{4}$.

a. (4 POINTS) Find $(f\circ g)(x)$ $= f[g(x)]$
$= f\left(\frac{x}{4}\right)$
$= 4\left(\frac{x}{4}\right)$
$= x$

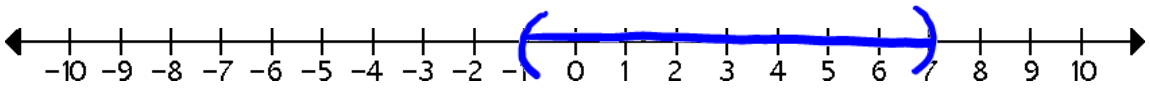
b. (4 POINTS) Find $(g\circ f)(x)$ $= g[f(x)]$
$= g(4x)$
$= \frac{4x}{4}$
$= x$

c. (1 POINT) Are f and g inverses of each other? Circle one: (Yes) No

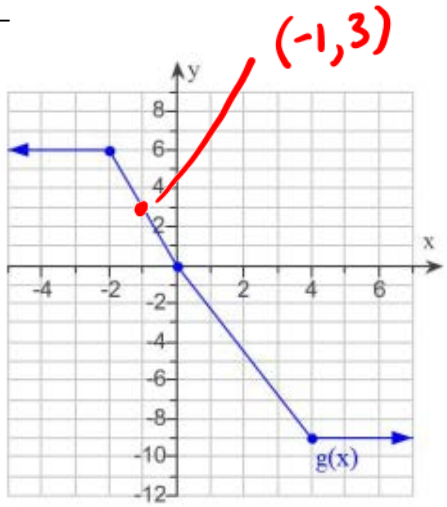
8. (10 POINTS) Solve and graph the solution on a number line.

$\frac{2|x-3|}{2} < \frac{8}{2}$
$|x-3| < 4$
$-4 < x-3 < 4$
$+3 \quad +3 \quad +3$
$-1 < x < 7$

Solution in interval notation: $(-1,7)$



9. (2 POINTS)
For what value of x is $g(x)$ equal to 3? -1



10. (10 POINTS) Solve.

$|3x-1|+9=11$

$-9 \quad -9$

$|3x-1|=2$

$3x-1=-2$ or $3x-1=2$

$+1 \quad +1 \qquad +1 \quad +1$

$\frac{3x}{3}=\frac{-1}{3} \qquad \frac{3x}{3}=\frac{3}{3}$

$x=-\frac{1}{3}$ or $x=1$

$\left\{-\frac{1}{3}, 1\right\}$

11. (4 POINTS) Find the intersection of the two sets.

$\{1,3,5,7\} \cap \{2,4,6,8\}$

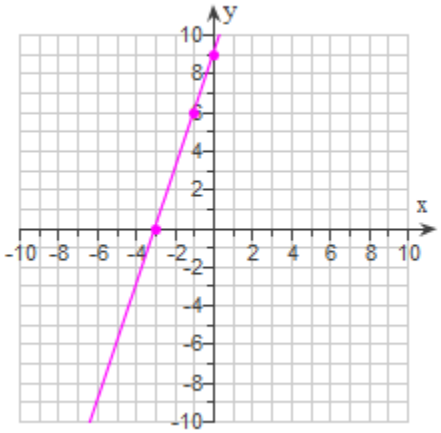
$\{\ \}$

12. (4 POINTS) Find the union of the two sets.

$\{1,3,5,7\} \cup \{2,3,4\}$

$\{1,2,3,4,5,7\}$

e graph of its inverse function.



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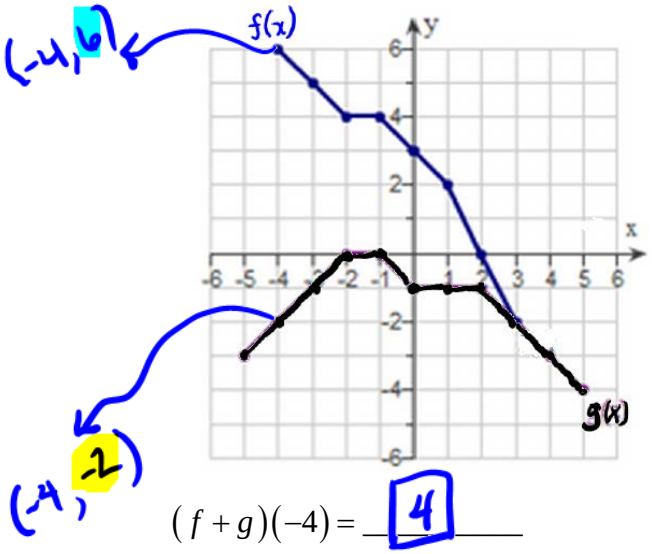
14. (6 POINTS) Use the graphs of f and g to find $(f+g)(-4)$



$= f(-4) + g(-4)$

$= 6 + (-2)$

$= 4$

$(f+g)(-4) =$ 4

15. (9 POINTS) Determine whether the relation is a function.

$\{(-1,2),(3,5),(5,0),(5,2)\}$

a. (2 POINTS) CIRCLE ONE: YES (NO)

b. (4 POINTS) Domain: $\{-1, 3, 5\}$

c. (3 POINTS) Range: $\{0, 2, 5\}$

Extra Credit. (5 POINTS)Simplify the complex rational expression.

$$\frac{\frac{1}{x^2-1}+1}{(x-1)^2} = \frac{\frac{1}{(x+1)(x-1)} + 1\,\frac{(x+1)(x-1)}{(x+1)(x-1)}}{(x-1)^2}$$

$$= \frac{1+x^2-1}{(x+1)(x-1)} \cdot \frac{1}{(x-1)^2}$$

$$= \boxed{\frac{x^2}{(x+1)(x-1)^3}}$$