MATH 64/GRACEY

NAME Key

EXAM 1/100 POINTS POSSIBLE

CREDIT WILL BE AWARDED BASED ON WORK SHOWN. THERE WILL BE NO CREDIT FOR GUESSING. PLEASE PRESENT YOUR WORK IN AN ORGANISED, EASY TO READ FASHION.

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

   $[-1,6)$

   (3 POINTS) The solution in set-builder notation is : $\{x \mid -1 \le x < 6\}$

   (3 POINTS)

2. (4 POINTS) For the pair of functions, f and g, determine the domain of fg.

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

   dom. of f & $(-\infty,\infty)$

   dom. of g: $x-2\neq 0 \rightarrow x\neq 2$

   $(-\infty,2)\cup(2,\infty)$

   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.

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

   $f(-1)=-(-1)+5=6$

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

   $f(6)=9(6)-2=54-2=52$

   a. $f(-1)=$ 6

   b. $f(0)=$ -2

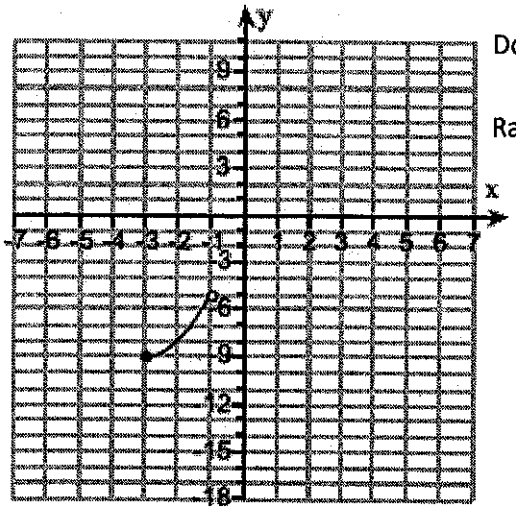
   c. $f(6)=$ 52

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

4. (6 POINTS) Use the graph to find the domain and range of the relation.

   6 + 52

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



   Domain in interval notation: $[-3,-1)$

   Range in interval notation: $[-9,-5)$

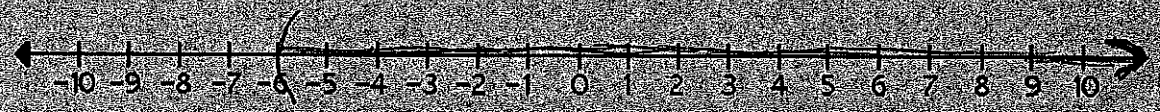
5. (8 POINTS) Consider the compound inequality $3x < 7x + 24$ and $5x > 7x + 6$. Use graphs to show the solution set to each of the two given inequalities, as well as a third graph that shows the solution set of the compound inequality. Except for the empty set, express the solution set in interval notation.

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

$-7x \quad -7x$

$\frac{-4x}{-4} < \frac{24}{-4}$ → $x > -6$

$(-6, \infty)$

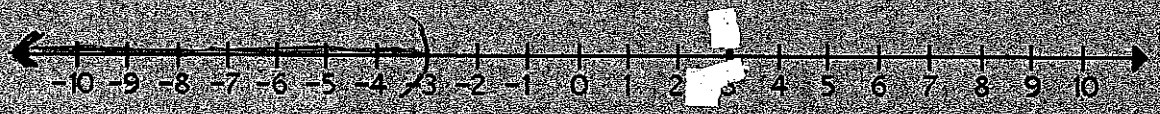


b. (3 POINTS) Solve the inequality and graph the solution set of $5x > 7x + 6$

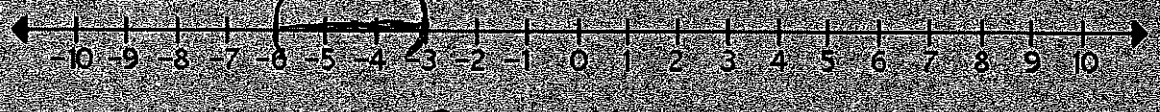
$-7x \quad -7x$

$\frac{-2x}{-2} > \frac{6}{-2}$ → $x < -3$

$(-\infty, -3)$



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

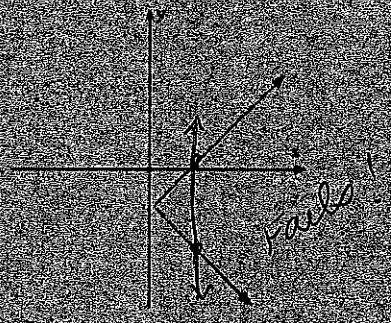


$-6 < x < -3$ or $(-6, -3)$

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.

$-2|x-7| \geq -8$

$\frac{-2}{-2} \quad \frac{-8}{-2}$

$|x-7| \leq 4$

$-4 \leq x-7 \leq 4$

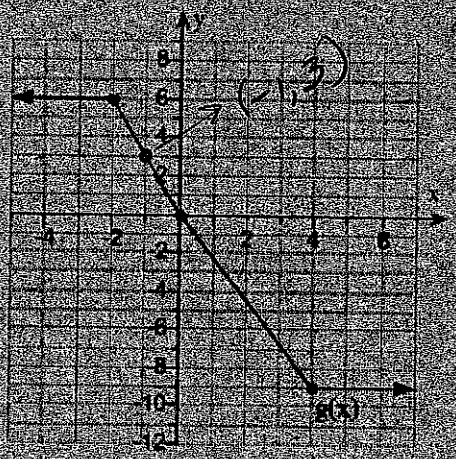
$+7 \quad +7 \quad +7$

$3 \leq x \leq 11$

Solution in interval notation: $[3, 11]$

9. (2 POINTS)

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



10. (4 POINTS) The graph below shows the three components of love, namely passion, intimacy, and commitment, progress differently over time. Passion peaks early in a relationship and then declines. By contrast, intimacy and commitment build gradually. What is the relationship between passion and commitment on the interval $[6,8)$?

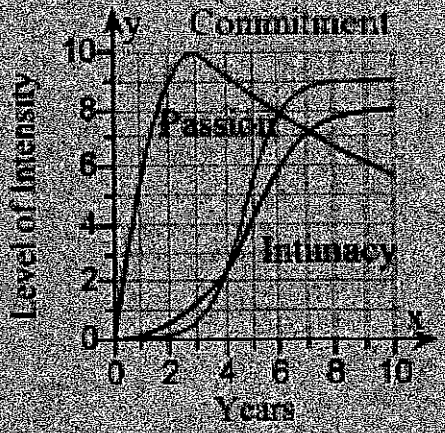
Circle one:

a. passion > commitment

b. passion ≥ commitment

c. passion < commitment

d. passion ≤ commitment



11. (10 POINTS) Solve.

$$|3x-11|+9=12$$
$$-9 \quad -9$$
$$|3x-11|=3$$

$3x-11=-3$ or $3x-11=3$

$+11 \quad +11$ $+11 \quad +11$

$\frac{3x}{3}=\frac{8}{3} \rightarrow x=\frac{8}{3}$ $\frac{3x}{3}=\frac{14}{3}$

$x=\frac{14}{3}$

$\left\{\frac{8}{3}, \frac{14}{3}\right\}$

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

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

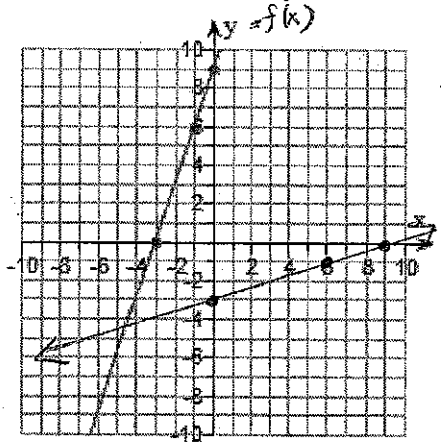
$\{1,2,3,4,5,6,7,8\}$

13. (4 POINTS) Find the intersection of the two sets.

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

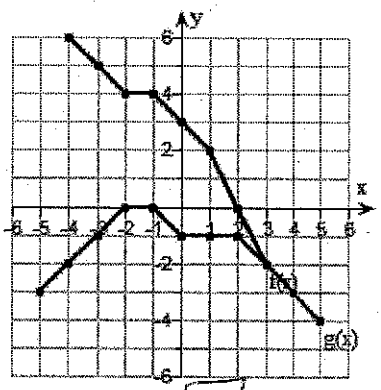
$\{3\}$

14. (8 POINTS) Use the graph of f to draw the graph of its inverse function.



points on f	points on $f^{-1}(x)$
$(-3,0)$	$(0,-3)$
$(-1,6)$	$(6,-1)$
$(0,9)$	$(9,0)$

15. (6 POINTS) Use the graphs of f and g to find $(f+g)(-3)$



$f(-3)=5$, $g(-3)=-1$

$f(-3)+g(-3) = 5+(-1) = 4$

$(f+g)(-3) =$ 4

16. (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.

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

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

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

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

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