Name_____

1. (7 pts) What is the domain of the function $f(x) = \sqrt{6 + 2x}$? Give your answer in
   a. set-builder notation (i.e., start with $\{x \mid$ $\}$), *and*
   b. interval notation.

2. Let $f(x) = \dfrac{x - 7}{x^2 + 2}$. Find the following values:

   a. (3 pts) $f(2)$

   b. (3 pts) $f(-2)$

3. (5 pts) What is the average rate of change of the function $f(x) = x^2 - 3x - 5$, from $x = 2$ to $x = 3$?

4. Determine whether each of the following relations represents a function. State the domain and range in each case.   But if one is *not* a function, explain why.

    a.   (5 pts) $\{(2,-1),(3,2),(7,-1),(5,2)\}$

Domain:

Range:

Function? (If not, why not?)

    b.   (5 pts) $\{(2,-1),(3,2),(7,-1),(3,-1)\}$

Domain:

Range:

Function? (If not, why not?)

5. (10 pts) Find the difference quotient of f, that is, find $\dfrac{f(x+h)-f(x)}{h}$, for

$f(x)=3x^2+2x$. Simplify your answer.

6. Let $f(x) = \dfrac{x-2}{x-5}$ and $g(x) = \sqrt{2x-6}$.

    a. (5 pts) What is the domain of f ? (Set notation or interval notation)
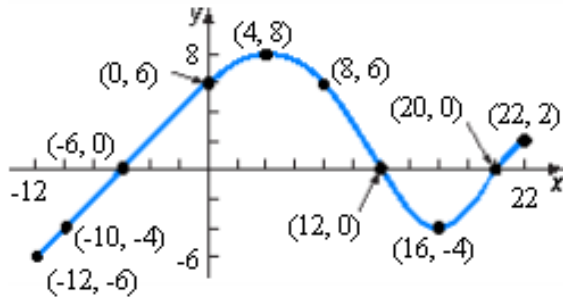
    b. (5 pts) What is the domain of g ? (Set notation or interval notation)

    c. Find the following functions and *find the domain of each one*. You do not need to simplify the functions.

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

        ii. (5 pts) $(f \circ g)(x)$ (The domain on this one is a little bit tricky.)

7. Use the graph of the function f, below, to answer the following questions.

a. (2 pts) What is $f(8)$?

b. (2 pts) Is $f(-9)$ positive or negative?

c. (2 pts) How often does the line $y = -5$ intersect the graph of f ?
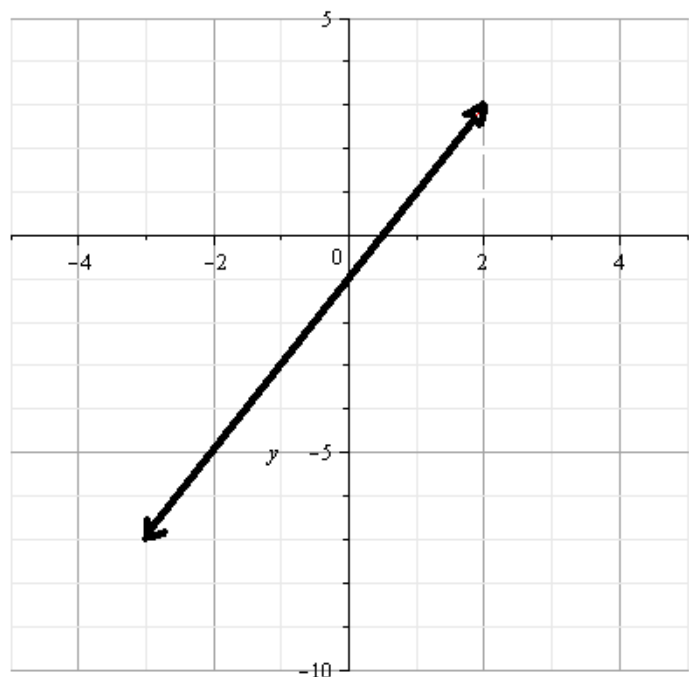
d. (2 pts) What is the domain of f ?

e. (2 pts) What is the range of f ?

f. (2 pts) List the interval(s) on which f is increasing.

8. (10 pts) Determine the equation of the line, below, from its graph. Give the equation in two forms:

a. point-slope
b. slope-intercept

9. Graph each of the following functions using the techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function and show all stages.

    a. (5 pts) $g(x) = 2(x-5)^2 + 7$

    b. (5 pts) $g(x) = \sqrt{x+2} - 3$

10. (10 pts) Sketch the graph of $f(x) = \begin{cases} x^2 - 2 & \text{if } -2 \le x < 2 \\ 2x + 2 & \text{if } 2 \le x \le 5 \end{cases}$. Include all intercepts.

State the domain and range.