1. (10 pts) If the domain of f is all real numbers in the interval [2, 7] and the domain of g is all real numbers in the interval (- 3, 5], then what is the domain of the function $f + g$?

2. (5 pts) What is the domain of the function $\dfrac{x+1}{x^2 - 7x - 8}$?

3. Consider the relation $R = \{(2,3),(5,-7),(3,12),(6,3),(5,11)\}$

    a. (5 pts) Is R a function? If not, why not?

    b. (5 pts) What is the domain of the relation R ?

    c. (5 pts) What is the range of the relation R ?

4. (10 pts) What is the average rate of change of the function $g(x) = x^2 + 5$ from $x = 2$ to $x = 4$?

5. Let $f(x) = \sqrt{x-3}$ and $g(x) = \dfrac{x-2}{x+4}$.

   a. (5 pts) What is the domain of f?

   b. (5 pts) What is the domain of g?

   c. Find the following functions and state their domains. Do not simplify!

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

   ii) (5 pts) $\left(\dfrac{f}{g}\right)(x)$

   iii) (5 pts) $(f \circ g)(x)$

6. (5 pts) Find the difference quotient $\dfrac{f(x+h)-f(x)}{h}$ for $f(x)=x^2+3x$, and simplify it.

7. 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.   (10 pts) $g(x)=-(x-2)^2-3$

b. (10 pts) $g(x) = \sqrt{4 - x} + 7$

8. (5 pts) Sketch the graph of the piecewise-defined function $f(x) = \begin{cases} x^2 + 1 & \text{if } x < -1 \\ 2x - 3 & \text{if } x \geq -1 \end{cases}$

9. (5 pts) Determine the piecewise-defined function from its graph, below.
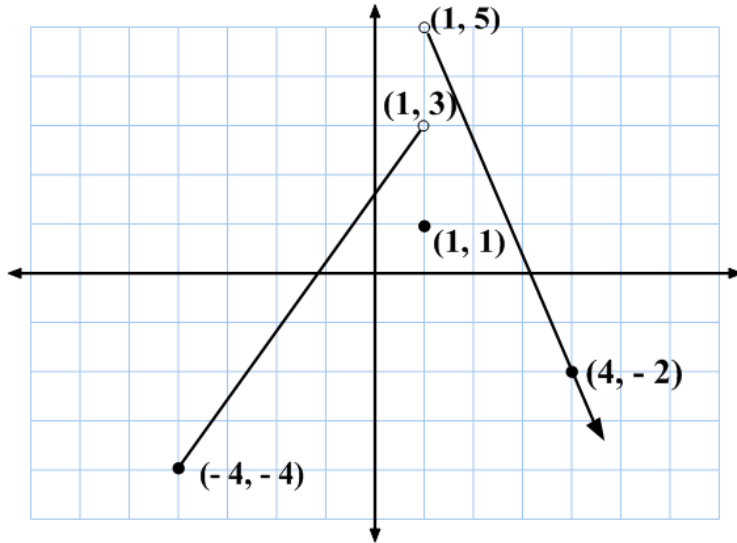
(5 pts) **BONUS**   Solve $x^2 - 6x - 11 = 0$ for x by completing the square. No other method will be accepted.