1. (10 pts) Is the relation $f = \{(3,-7),(4,-1),(2,5),(9,-1)\}$ a function? Explain in words.

2. (5 pts) What's the domain of f?

3. (5 pts) What's the range of f?

4. Let $f(x) = \dfrac{x+7}{x-2}$ and $g(x) = \sqrt{x+1}$.

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

    c. Determine the following functions. You don't need to simplify. In fact, I recommend you do not.

        i) (5 pts) $f + g$

        ii) (5 pts) $f \circ g$

    d. (5 pts) What is the domain of $f + g$? State your final answer in interval notation.

    e. (5 pts) What is the domain of $f \circ g$? State your final answer in interval notation.

5. (5 pts) Simplify the difference quotient, $\dfrac{f(x+h)-f(x)}{h}$, for $f(x)=x^2-5x$.

Bonus Pass to the limit, as $h \to 0$, on your answer to the above, so you can show me some calculus.

6. (5 pts) Explain to me why the equation $x^2 + y^2 = 49$ does *not* define y as a function of x.

7. (5 pts) Draw me a picture showing what the difference quotient represents for the function $f(x)=\sqrt{x}$.

Bonus Simplify the difference quotient for $f(x) = \sqrt{x}$.

8. (10 pts) Answer one of the following:

a.   Show that $f(x) = \dfrac{2}{3}x - 7$ is one-to-one, algebraically.

b.   If $f(x) = x^2 - 6x + 7$, for $x \geq 3$, what is $f^{-1}(x)$?.

9. (10 pts) Show that $f(x) = \dfrac{x+3}{x-1}$ is its own inverse. In other words, show that in this example, f and f^{-1} are the same, exact function! There are two ways to accomplish this:

    1. By finding f^{-1}, directly.

    2. By the definition of f^{-1}.

10. (10 pts) Suppose y varies jointly with m_1 and m_2, and inversely with the square of r. Write an equation describing this situation.