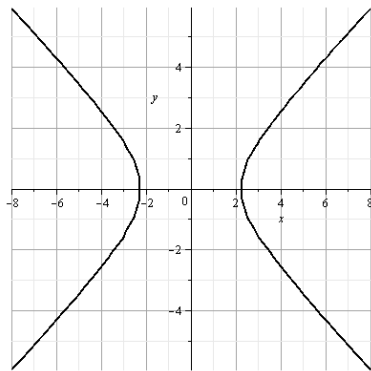1. (10 pts) $f = \{(1,-1),(2,4),(3,2),(4,4)\}$

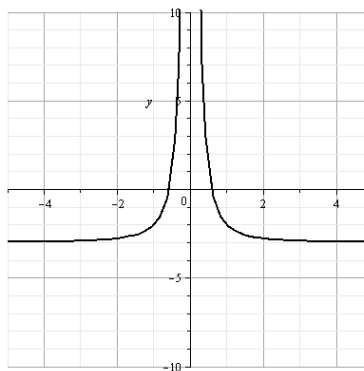   a.   Function? (Yes/no)

    b.   If not, why not?

    c.   If it *is* a function, is it 1-to-1? (Yes/no)

    d.   If it is *not* 1-to-1, why not?

    e.   What's the domain?

    f.   What's the range?

2. (10 pts) For each of the following graphs, determine if the relation is a function. If it is a
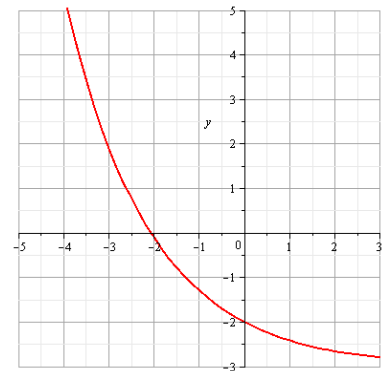function, state whether or not it is 1-to-1.

Is it a function?   Is it a function?   Is it a function?

If it is a function, is it 1-to-1?   If it is a function, is it 1-to-1?   If it is a function, is it 1-to-1?

3. (5 pts) Determine whether or not $|y+3| - 2x = 5$ defines y as a function of x. If it does not,

show/explain why not. (Solve for y and look at how many solutions you get.)

4. (10 pts) Let $f(x) = x^2 + 3$. Simplify the difference quotient $\dfrac{f(x+h) - f(x)}{h}$.

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

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

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

   c. (5 pts) Find $(f \circ g)(x)$. (Do not simplify.)

   d. (5 pts) What is the domain of $(f \circ g)(x)$?

   e. Determine each of the following functions (without simplifying) and state the domain of each in *interval notation*.
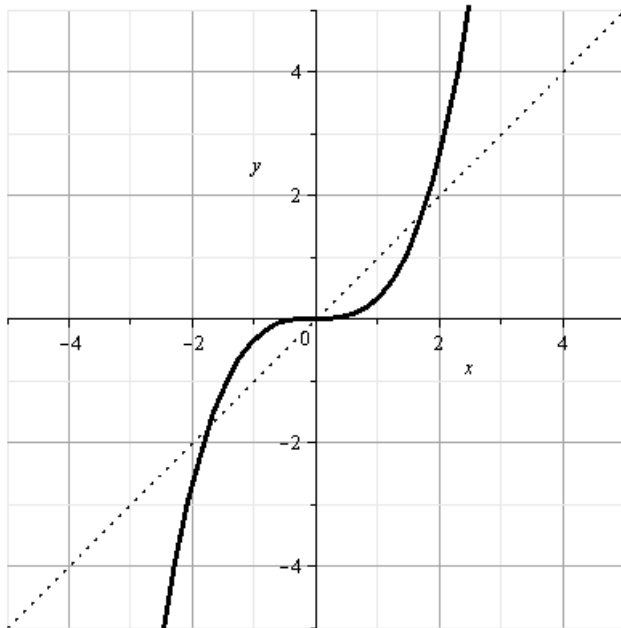
      i. (5 pts) $(f + g)(x)$

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

6. (5 pts) Answer *one* of the following:

a. Show that $f(x) = \dfrac{x-1}{x+2}$ is 1-to-1, algebraically.

b. Let $f(x) = \dfrac{x-1}{x+2}$. Find $f^{-1}(x)$.

7. (5 pts) The graph of f is given. Sketch the graph of f^{-1}.

8. (5 pts) If f varies jointly as m_1 and m_2 and inversely with the square of r, write the equation describing this relationship.

9. Graph each of the following functions using techniques of shifting, compressing, stretching, and/or reflecting. Start with the graph of the basic function and show all stages in separate sketches. Track 3 key points through the transformations.

　　a. (5 pts) $h(x) = 2(x-3)^2 + 3$

#9, continued... Graph using transformations.

    b. (5 pts) $g(x) = \sqrt{3-x} + 5$ (Hint: $3 - x = -x + 3$ is one way. $3 - x = -(x-3)$ is another.)

10. (5 pts) Find the inverse of $f(x) = 3x - 7$