MATH 11010: Exam #1 (Fall 2012)

1. A function f is given, and the indicated transformations are applied to its graph in the given order. Write the equation for the final transformed graph.

   (a) $f(x) = x^2$; reflected about the $x-$axis, vertically shrunk by a factor of $\frac{1}{5}$, horizontal shift right 8 units

   (b) $f(x) = \sqrt{x}$; reflected about the $y-$axis, stretched horizontally by a factor of 4, vertical shift down 3 units.

2. Find the domain for each function.

   (a) $f(x) = \dfrac{\sqrt{15-2x}}{7x+3}$ (b) $g(x) = \dfrac{x-7}{4x^2-4x-15}$

3. Find the equation of the line which passes through $(3,-5)$ and $(-7,4)$.

4. Find the equation of the line perpendicular to $4x-5y=3$ and which passes through $(-2,4)$.

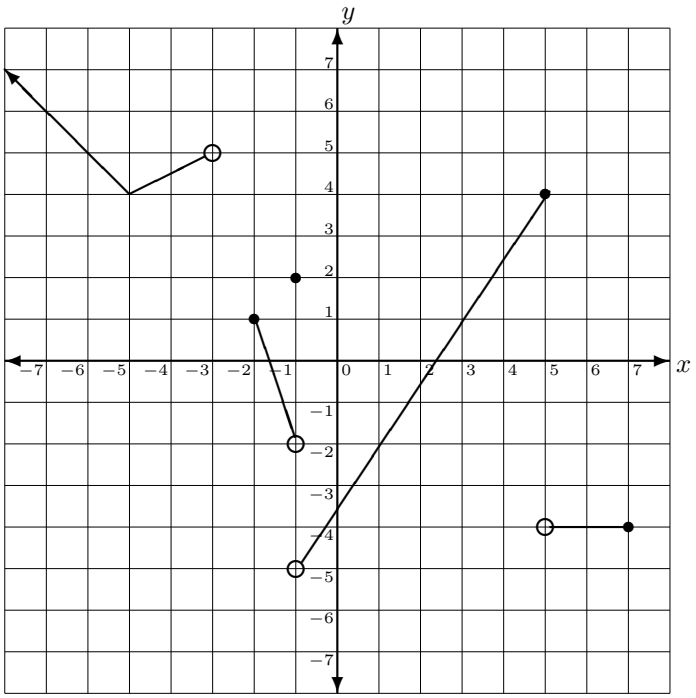
5. Give an example of a graph that is **NOT** a function, and explain why it is not a function.

6. Find the following if $f(x) = \begin{cases} 3x^2-2x+4 & \text{if } x<-1 \\ 7x+3 & \text{if } -1 \le x < 6 \\ 5x-x^2 & \text{if } x \ge 6 \end{cases}$

   (a) $f(7) =$ (b) $f(2) =$ (c) $f(-1) =$

7. Graph $f(x) = \begin{cases} 4 & \text{if } x \le -3 \\ 2x+1 & \text{if } -3 < x < 2 \\ -3x+8 & \text{if } x \ge 2 \end{cases}$

8. Given below is the graph of f. Find



(a) Domain of f

(b) Range of f

(c) $f(-3) =$

(d) $f(-1) =$

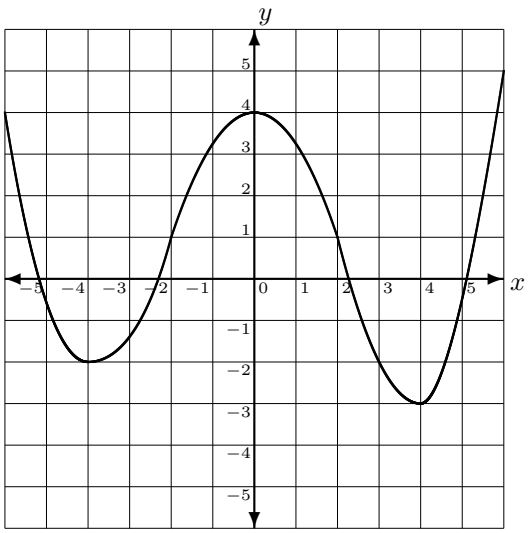
(e) $f(1) =$

(f) $f(5) =$

9. Let $H(x) = 5\left(4x^2 + 7\right)^3 - 11$. Find nontrivial functions f and g such that

$$(f \circ g)(x) = H(x)$$

10. Below is the graph of f.



(a) Identify the coordinates of any relative minimum/minima

(b) Identify the coordinates of any relative maximum/maxima

(c) Determine the intervals for which f is increasing.

(d) Determine the intervals for which f is decreasing.

11. For $f(x) = -3x^2 + 7x - 5$ find $\dfrac{f(x+h) - f(x)}{h}$

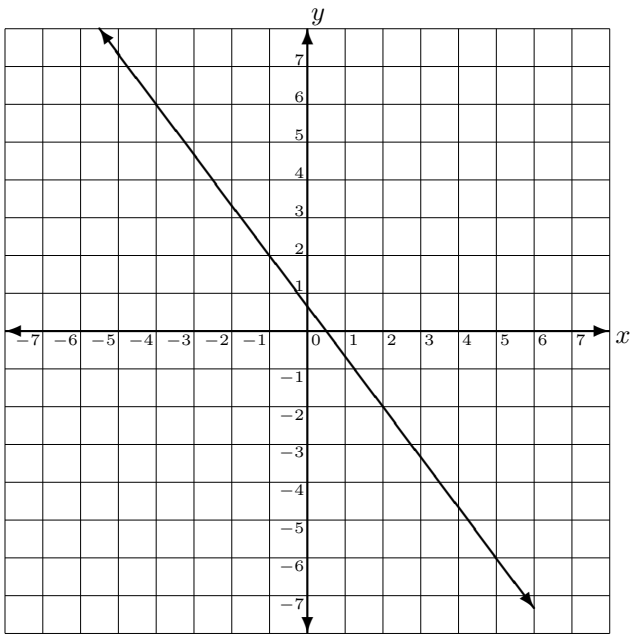
12. For $f(x) = \dfrac{x}{x+6}$ find $\dfrac{f(x+h) - f(x)}{h}$

13. Let $f(x) = 2x^2 - 5x + 7$ and $g(x) = 2x + 1$. Find and simplify:

(a) $(f \circ g)(x)$ (b) $(g \circ f)(x)$ (c) $(f \circ f)(2)$ (d) $(g \circ g)(-8)$

14. Be able to determine the equation of the given graph of a function. (Note there are no vertical or horizontal stretches or shrinks.)

15. Given below is a linear function.



(a) Find the slope of this linear function.

(b) Find the equation of this linear function.