

Name:

Class time:

M305G - Practice Exam I - Week of September 15th, 2008

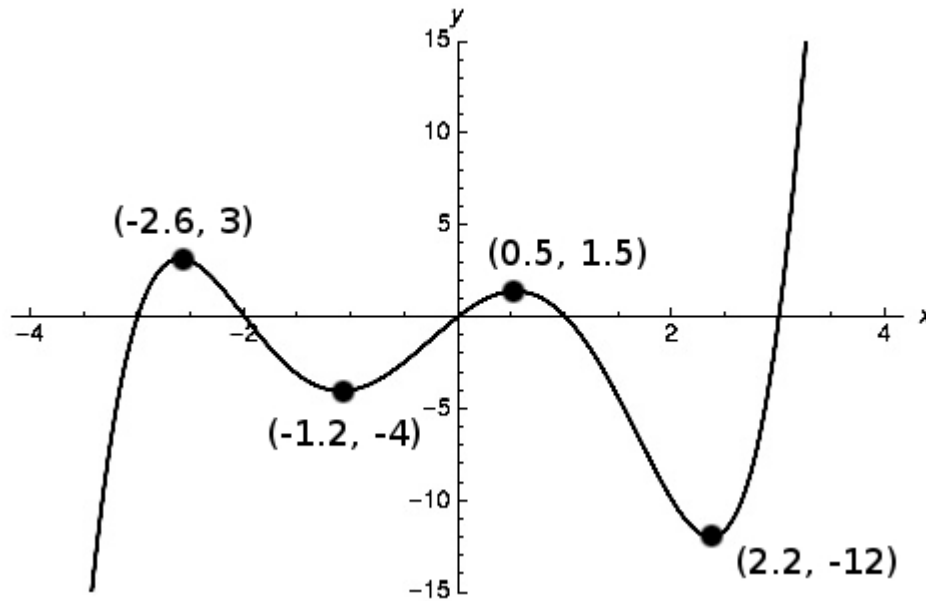
Carefully read each question, and be sure to show your work.

1. (10 points) Let  $f(x) = \frac{-x}{x^3-4x}$ .

(a) (5 points) Is  $f(x)$  even, odd, or neither?

(b) (5 points) What is the domain of  $f$ ?

2. (20 points) Consider the graph of a function  $f(x)$ , shown below:



(a) (5 points) What is  $f(0.5)$ ?

(b) (5 points) What are the  $x$ -intercepts of this graph? The  $y$ -intercepts?

(c) (5 points) On what intervals is this function decreasing?

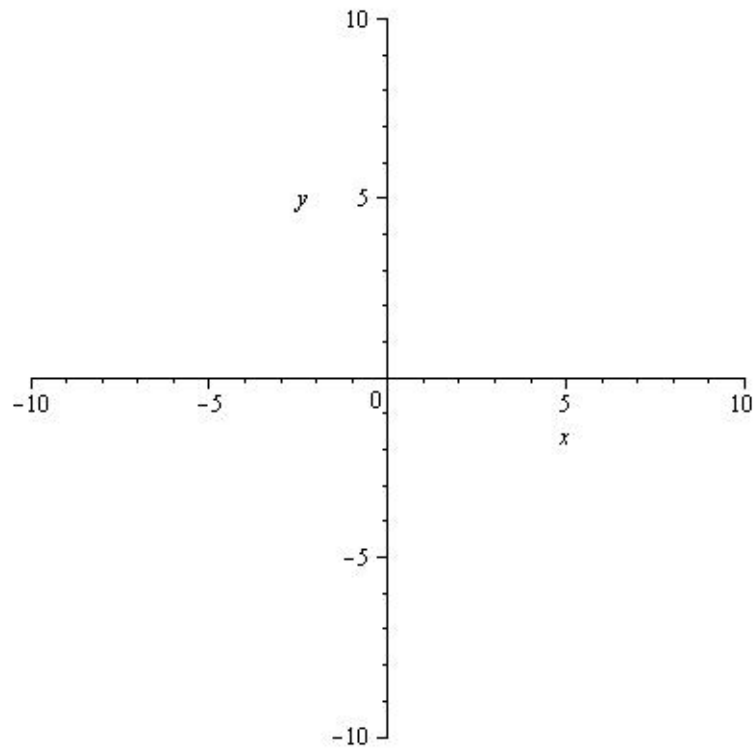
(d) (5 points) Where are the local maxima of this function? What is the value of the function at each of them?

3. (10 points) Consider the following piecewise-defined function:

$$h(x) = \begin{cases} \frac{x}{3} + 2 & -6 \leq x \leq 0 \\ x & x > 0 \end{cases}$$

(a) (5 points) What is  $h(-6)$ ?  $h(0)$ ?  $h(1)$ ?

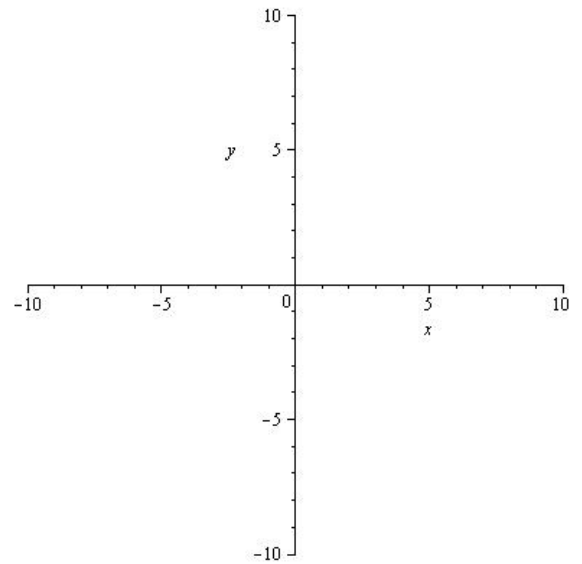
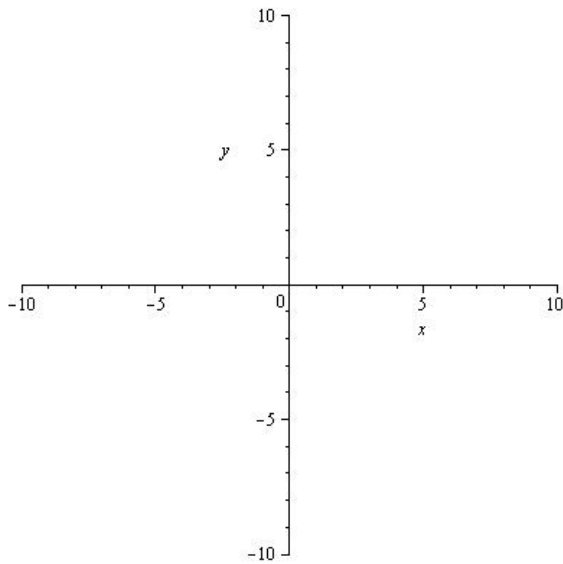
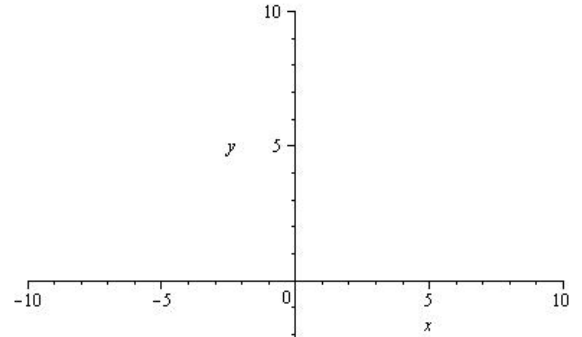
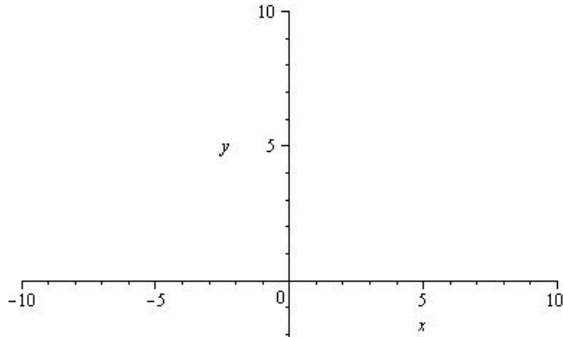
(b) (5 points) Graph  $h(x)$  and clearly label all three points you found to be on the graph from part (a).



4. (20 points) Starting with the graph of the basic function from your library of functions and showing all stages, graph the function

$$g(x) = -2|x - 1| + 1$$

using the techniques of shifting, compressing, stretching, and/or reflecting. Label at least three points on each graph.



5. (20 points) Recall that a general quadratic function  $f(x) = ax^2 + bx + c$  may be rewritten  $f(x) = a(x - h)^2 + k$  for appropriate  $h$  and  $k$ . For this problem, let  $g(x)$  be the quadratic function

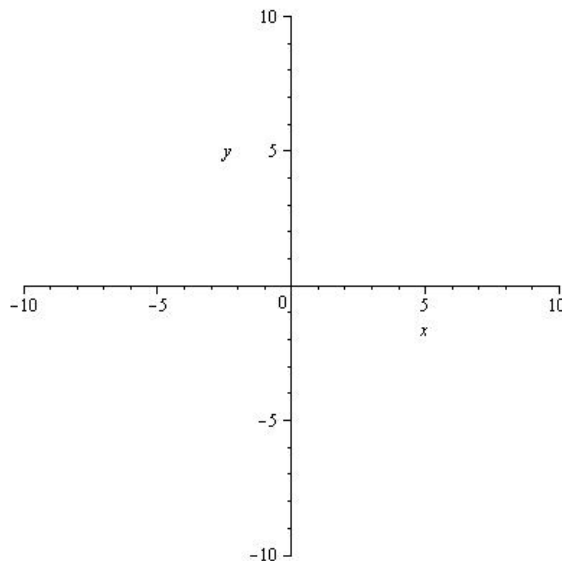
$$g(x) = x^2 - x - 5.$$

- (a) (5 points) Find  $h$  and  $k$  for  $g(x)$ . Without drawing the graph of  $g(x)$ , determine its vertex and axis of symmetry.

- (b) (5 points) Find the  $y$ -intercept of  $g(x)$ .

- (c) (5 points) What are the  $x$ -intercepts of  $g(x)$ ?

- (d) (5 points) Graph  $g(x)$  below. Label all points that you found in parts (a) through (c).



6. (20 points) In this problem, you will create and graph a polynomial function.

(a) (5 points) Form a polynomial  $f(x)$  having ALL OF THE FOLLOWING as real zeros:

- $x = -2$  of multiplicity 2
- $x = 0$  of multiplicity 1
- $x = 3$  of multiplicity 1

(Note: there is more than one right answer for this problem.)

(b) (5 points) What is the degree of your polynomial?

(c) (5 points) What is the  $y$ -intercept of the graph of  $f(x)$ ?

(d) (5 points) Sketch the graph of your polynomial.

