Exam 1

Name _____

Math 143

Fall 2003

This exam covers Sections 3.1, 3.2, 3.3, and 3.4 of the textbook. **Show all work and simplify all answers.** If you use your calculator to arrive at a conclusion, state what you did on your calculator. Box your final answer. There are 4 pages and 100 points: budget your time on each problem effectively.

1. [15 points] Determine the domain of each function. Show all work, including sign charts or number lines with test points.

   (a) $y = 9 - x^2$

   (b) $y = \dfrac{1}{9 - x^2}$

   (c) $y = \sqrt{9 - x^2}$

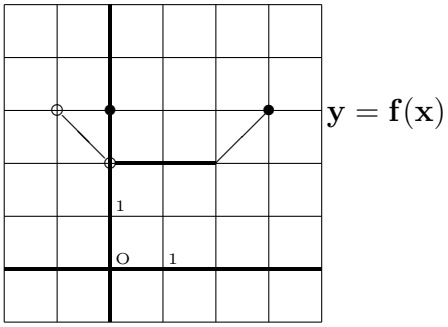
2. [13 points] Let $f(x) = 2x + 3$ and let $g(x) = x^2$. Compute each of the following. Show at least one intermediate step in each part. Simplify your answer.

   (a) [4 points] $g(3x)$

   (b) [4 points] $(fg)(-2)$

   (c) [5 points] $(g \circ f)(x)$

3. [26 points] The graph of the functions f is given in the figure. Answer the following questions. For each question, you must give some indication of how you arrived at your answer, even if just by referring to and labeling a point on the graph that you looked at.



(a) What is $f(0)$?

(b) What is the domain of f? Write your answer in interval notation.

(c) What is the range of f? Write your answer in interval notation.

(d) What is $f(f(1))$?

(e) For which values of x is $f(x) = 3$?

(f) For which x-values is $f(x)$ increasing?

(g) What is the maximum value of f?

4. [10 points] Let $f(x) = x^2 - 1$. Compute the difference quotient $\dfrac{f(x+h) - f(x)}{h}$. Be sure to simplify your answer.

5. [6 points] Write the function $h(x) = \sqrt{x^3 + 4x}$ as a composition of two simpler functions f and g. Name the simpler functions so that $h = f \circ g$.

6. [12 points] The functions f and g are defined by

x	-2	-1	0	1	2
$f(x)$	-3	2	0	-2	3

x	-2	-1	0	1	2
$g(x)$	-3	0	1	2	5

Find the following. Some explanation or work must be given for each answer.

(a) [5 points] $(f \circ g)(1)$

(b) [4 points] $(f + g)(-1)$

(c) [3 points] the range of f

7. [8 points] Graph $y = -|x| + 5$. Label scale on your axes. Also label all intercepts.

8. [10 points] Match equation (a)-(j) on the first list with an appropriate set of instructions (A)-(J) in the secod list.

(a) $y = f(x - 2)$
(b) $y = -f(-x) + 2$
(c) $y = f(x) - 2$
(d) $y = -f(x + 2)$
(e) $y = f(-x) - 2$
(f) $y = f(x + 2)$
(g) $y = -f(x) - 2$
(h) $y = f(-x + 2) + 2$
(i) $y = f(x) + 2$
(j) $y = -f(x) + 2$

(A) Translate left 2 units
(B) Translate right 2 units
(C) Translate up 2 units
(D) Translate down 2 units
(E) Reflect in the x-axis, then translate left 2 units
(F) Reflect in the x-axis, then translate down 2 units
(G) Reflect in the x-axis, then translate up 2 units
(H) Reflect in the y-axis, then translate down 2 units
(I) Translate left 2 units, then reflect in the y-axis, then translate up 2 units
(J) Reflect in the x-axis, reflect in the y-axis, then translate up 2 units