College Algebra, Math 143, Kriloff
Exam 1, Fall 2002

Instructions: Show your work! If you use a calculator, write what you computed or sketch the graph you used. Include intermediate steps. Multiple answers or a correct answer without a reasonable amount of work might receive no credit. Give exact answers unless asked for decimal approximations. When finished, check your work by hand or on your calculator.

1. (10 points) Let $f(x) = 3x^2 - 2$.

   (a) Find $f(1 - \sqrt{2})$. Give an *exact* value and simplify your answer.

   (b) Find $f(-2x) + 1$. Simplify your answer.

   (c) Find the average rate of change of f on the interval $[-1, 2]$.

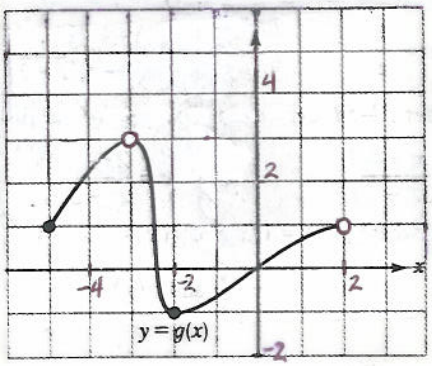
2. (10 points) Find the domain of each function. Give your answer in interval notation.

   (a) $f(x) = -x^2 - 3x + 10$

   (b) $f(x) = \dfrac{1}{-x^2 - 3x + 10}$

   (c) $f(x) = \sqrt{-x^2 - 3x + 10}$

3. (9 points) The graph of $g(x)$ is shown.



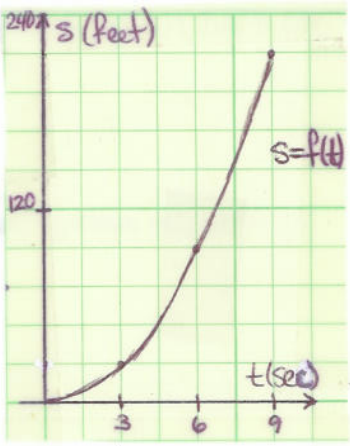
(a) Give the minimum value of g.

(b) Give the range of g.

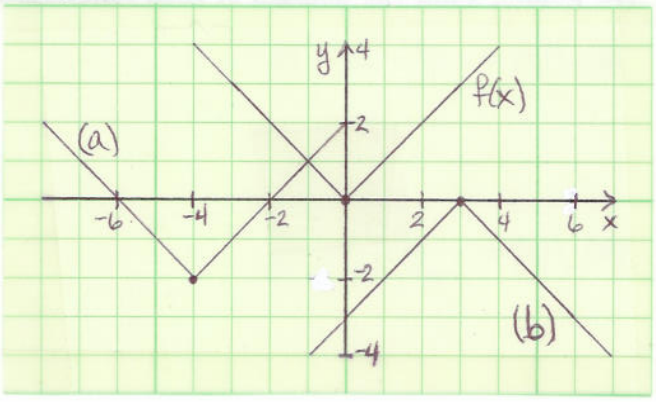
(c) For which value(s) of x is $g(x) = 1$?

(d) Give the interval(s) on which g is increasing.

4. (5 points) The graph of the distance s travelled by a falling ball is shown below. Is the average velocity of the ball, $\frac{\Delta s}{\Delta t}$ greater on the interval $[0, 6]$ or on the interval $[0, 9]$? Explain and/or show how you can tell.



5. (8 points) Give formulas for the indicated graphs. Use both general function notation **and** give a specific formula.

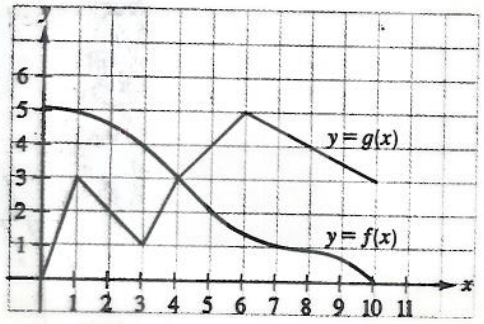


(a)

(b)

6. (5 points) Explain carefully in words how to obtain the graph of $f(-x + 5)$ from the graph of $f(x)$.

7. (12 points) Find the following using the graphs of f and g given below.



(a) $(g+f)(4)$

(b) Value(s) of x with $(f-g)(x) \leq 0$.

(c) $f(g(6))$

(d) $(g \circ g)(8)$

8. (3 points) Find $(H \circ K)(0)$ or state that it is undefined.

x	-2	0	3	5	6
$H(x)$	1	4	2.5	0	-3

x	-4	-2	0	1	4
$K(x)$	1/3	3	-2	0	6

9. (8 points) Let $k(x) = 10$, $g(x) = x+1$, and $h(x) = \dfrac{3-x}{x^2}$.

(a) Find $h(g(x))$ **and** give its domain.

(b) Find $k(h(x))$.

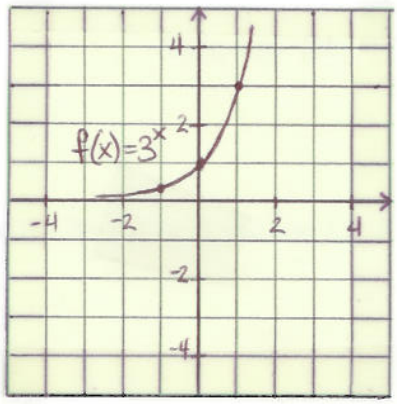
10. (4 points) Find $f(x)$ and $g(x)$ so that $f(g(x)) = -5\sqrt[3]{x} + 7$. (Your $f(x)$ and $g(x)$ cannot be just x.)

11. (8 points) Let $g(x) = \dfrac{1}{x^3 - 2}$.

(a) $\dfrac{1}{g(x)} =$

(b) $g^{-1}(x) =$

12. (9 points) The graph of $f(x) = 3^x$ is shown.



(a) Explain how you can tell from the graph that f has an inverse function. (The x-axis is an asymptote.)

(b) Carefully sketch the graph of f^{-1} on the same axes.

(c) Give the domain of f^{-1}.

13. (a) (3 points) Complete the sentence to make a correct and precise statement. A function f is one-to-one if and only if

(b) (2 points) Give an example of a function that is not one-to-one.

14. (4 points) Let $G(t)$ be the temperature in Celsius of a solution t minutes into a chemistry experiment. Assuming that $G(t)$ is a one-to-one function for $0 \leq t \leq 10$, use the table to estimate $G^{-1}(25)$ and state what this number means in practical terms.

t (mins)	0	3	6	8	10
$G(t)$ (°C)	22	23	27	28	28.5