

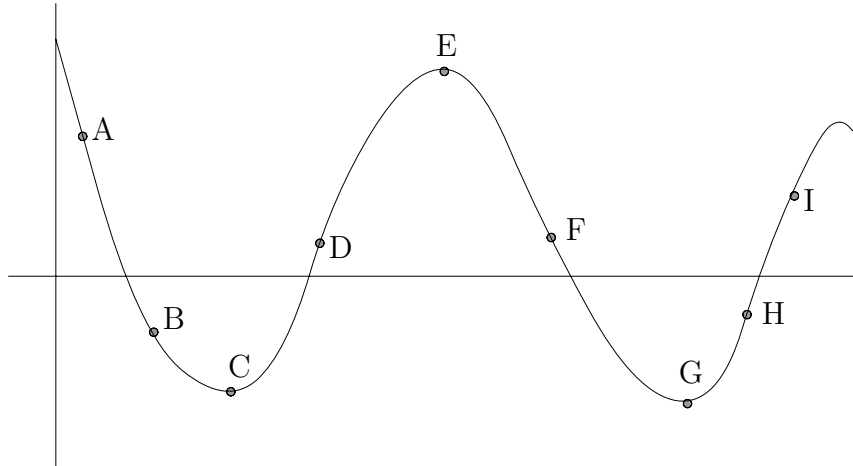
**Mathematics 122 Test #2**

Name: \_\_\_\_\_

**You are to use your own calculator, no sharing.**

**Show your work to get credit.** This means that if you use your calculator to solve a problem, then you have to write a sentence telling how you used it to do the calculations. (That is if you graphed it and zoomed in then say that is what you did etc.

1. (10 Points) Let  $f = f(x)$  have the following graph.



(a) At which of the labeled points is  $f'(x) > 0$ ?

\_\_\_\_\_

(b) At which is the labeled points is  $f'(x) < 0$ ?

\_\_\_\_\_

(c) At which is the labeled points is  $f'(x) = 0$ ?

\_\_\_\_\_

(d) At which of the labeled points if  $f(x)$  largest?

\_\_\_\_\_

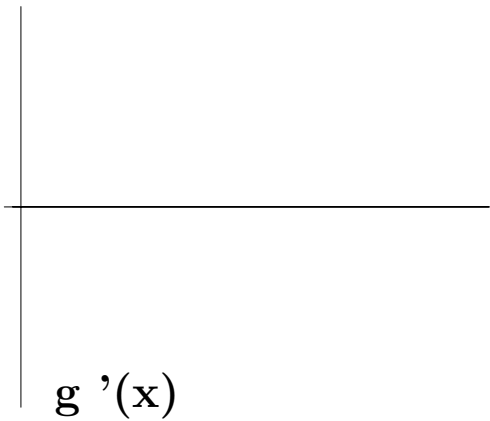
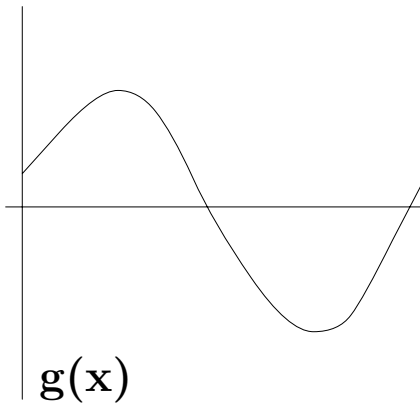
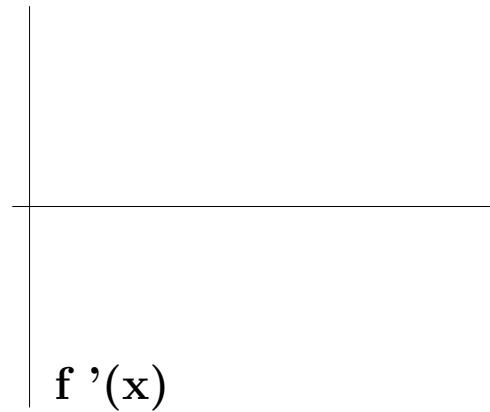
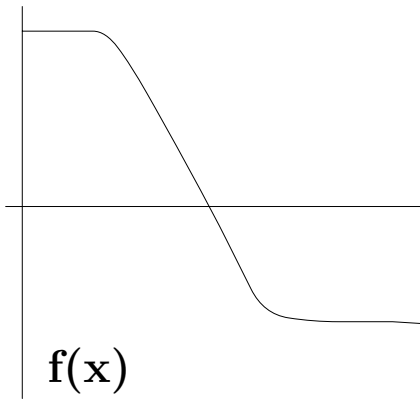
(e) At which of the labeled points is  $f'(x)$  largest?

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2. (5 points) Let  $f(t) = (1.5)^t$ . Then estimate  $f'(1)$

$f'(1) \approx$  \_\_\_\_\_

3. (10 Points) Below are the graphs of  $y = f(x)$  and  $y = g(x)$ . Sketch the graphs of  $y = f'(x)$  and  $y = g'(x)$ .



4. (10 Points) Draw the graph of a function  $y = f(x)$  so that  $f'(x) > 0$  for  $0 < x < 2$ ,  $f'(x) < 0$  for  $2 < x < 3$  and  $f'(x) > 0$  for  $3 < x < 5$ .

5. (10 Points) Let the function  $u = f(t)$  have its values as in the following table:

$t$	.5	1.0	1.5	2.0	2.5
$f(t)$	-1.25	-2.0	-2.25	-2.0	-1.25

(a) What is that average rate of change of  $f$  on the interval from  $t = 1.0$  to  $t = 2.5$ ?

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(b) What is an estimate for  $f'(2.5)$ ?

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(c) What is a good estimate for  $f(3)$ ?

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6. (10 Points) The weight,  $W$ , of a child in lbs is a function of its age,  $a$ , in years. We have  $W = f(a)$ .

(a) Do you expect  $f'(a)$  to be positive or negative? Explain your answer.

(b) What are the units on  $f'(a)$ ?

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(c) If  $f(7) = 45$  and  $f'(7) = 9$  then what is a reasonable guess of the weight of the child when it is 7 years and 6 months old?

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7. (15 Points) Draw Graphs of functions that satisfy the following:

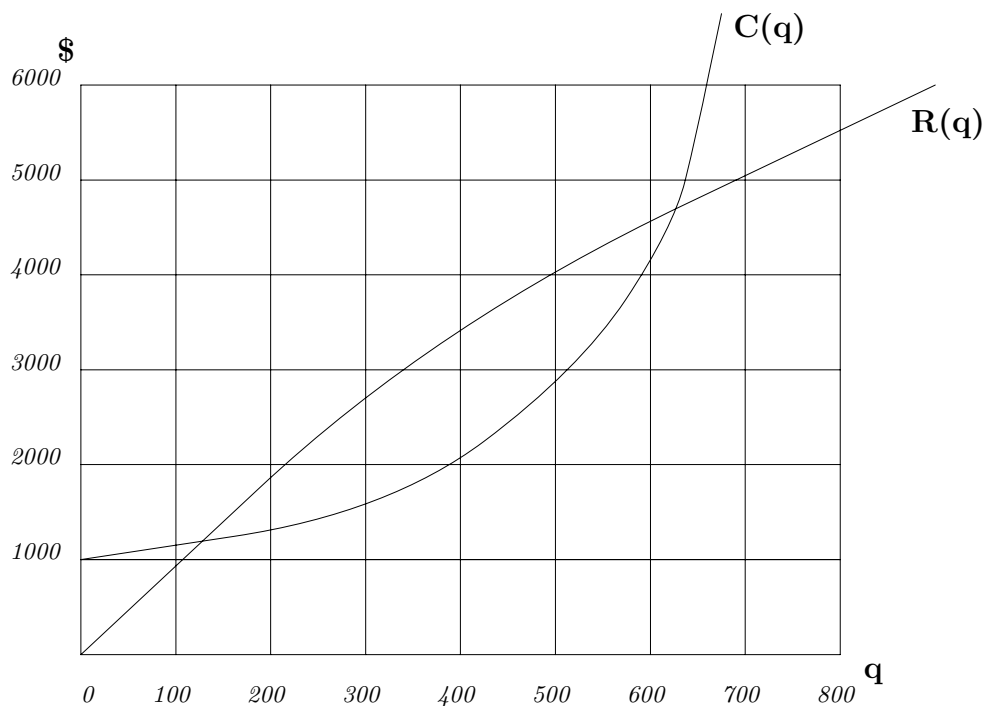
(a) Is increasing at an increasing rate.

(b) Is decreasing and concave up.

(c) Has  $f'(x) > 0$  and  $f''(x) < 0$

(d) has  $f''(x) < 0$  and  $f'(1) = 0$ .

8. (15 Points) A group of students decide to market a soliton manual to a calculus book. The following graph shows the cost,  $C(q)$ , and the revenue,  $R(q)$ , from producing a quantity  $q$  of the manuals.



- (a) About how much were the startup costs of the for producing the manuals?  
\_\_\_\_\_
- (b) From the graph roughly how much is the marginal revenue  $R'(100)$  of producing 100 manuals?  
\_\_\_\_\_
- (c) If the students are producing 300 manuals then is it in their interests to produce more manuals? Write a sentence or two explaining your answer.
- (d) If the students are producing 600 manuals then is it in their interest to product more manuals? Write a sentence or two explaining your answer.
- (e) Make a guess the number of manuals they should product to maximize their profit.  
\_\_\_\_\_

9. (10 Points) Let  $C(q)$  be the cost function for producing a quantity  $q$  of some item. Assume that  $C(78) = 376$  and that the marginal cost is  $C'(78) = 4$ .
- (a) What is a good estimate of the cost,  $C(79)$  of producing 79 items?

$$C(79) \approx \underline{\hspace{4cm}}$$

- (b) What is a good estimate of the cost,  $C(77)$  of producing 77 items?

$$C(77) \approx \underline{\hspace{4cm}}$$

10. (5 Points) From the following table of values give an estimate for the second derivative of  $W(1.5)$ .

$x$	.5	1.0	1.5	2.0	2.5
$W(x)$	8.5	12.0	16.5	22.0	28.5

$$W'(1.5) \approx \underline{\hspace{4cm}}$$