

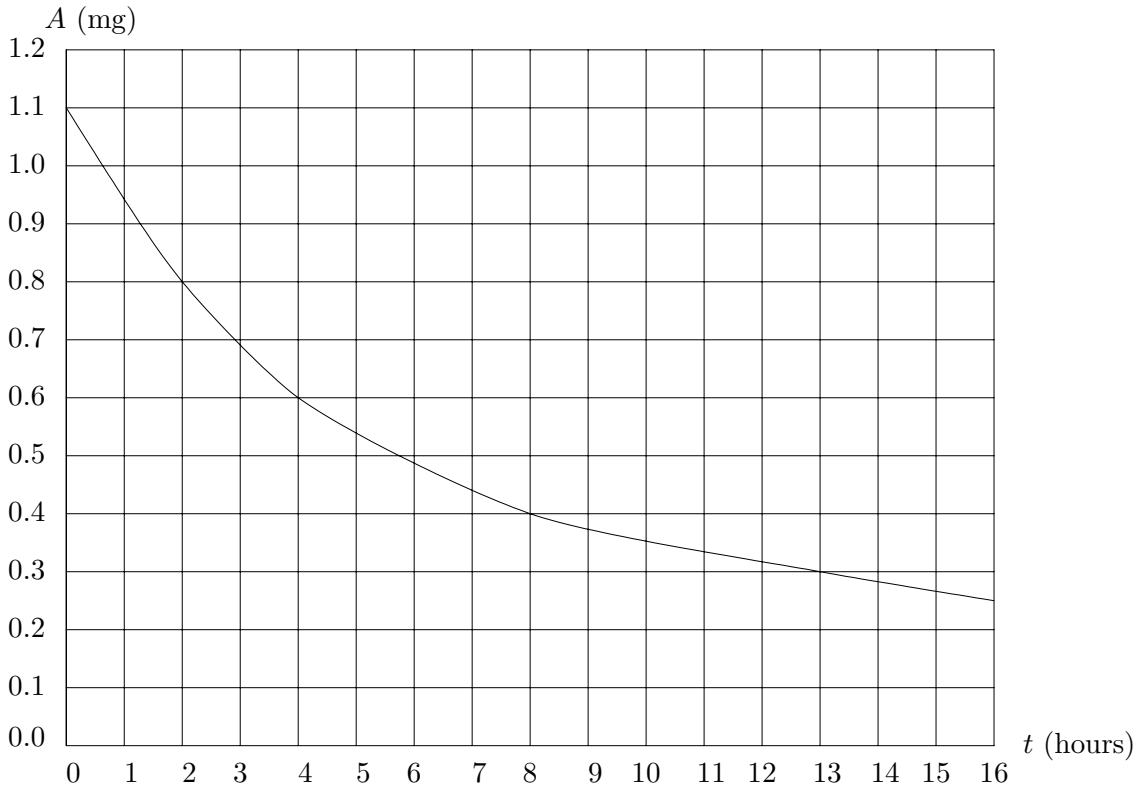
Mathematics 122 Test #1

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.) The figure below shows the amount  $A$  in milligrams of drug in a patients system  $t$  hours after it is administered.



- (a) How many milligrams are there is the patients system after 8 hours?  
\_\_\_\_\_
- (b) How long after the drug is administered is it at half the initial amount?  
\_\_\_\_\_
- (c) What is the average rate of change of the amount of the drug in the body between during the first four hours after the drug is administered.  
\_\_\_\_\_
- (d) Estimate the instantaneous rate of change of the amount of the drug in the body 8 hours after it was administered.  
\_\_\_\_\_

(2) (10 Points) Corresponding values of  $p$  and  $q$  are given by the table:

$p$	0	2	4	7
$q$	-4	2	8	17

Assuming that the relationship between  $p$  and  $q$  is linear answer the following:

(a) Find  $p$  as a linear function of  $q$ .

\_\_\_\_\_

(b) Find  $q$  as a linear function of  $p$ .

\_\_\_\_\_

(c) What is the value of  $q$  when  $p = 13$ ?

\_\_\_\_\_

(3) (10 points) Solve the following using your calculator and give your answer to three decimal places.

(a)  $x^5 + x + 20 = 0$

$x =$  \_\_\_\_\_

(b)  $3^{2r} = 10 - 4r$ .

$r =$  \_\_\_\_\_

(4) (15 points) A company has a cost function of  $C(q) = 3000 + 2q$  and a revenue function of  $R(q) = 8q$ .

(a) What are the fixed costs for the company?

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(b) What is the variable cost per unit?

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(c) What price is the company charging for its product?

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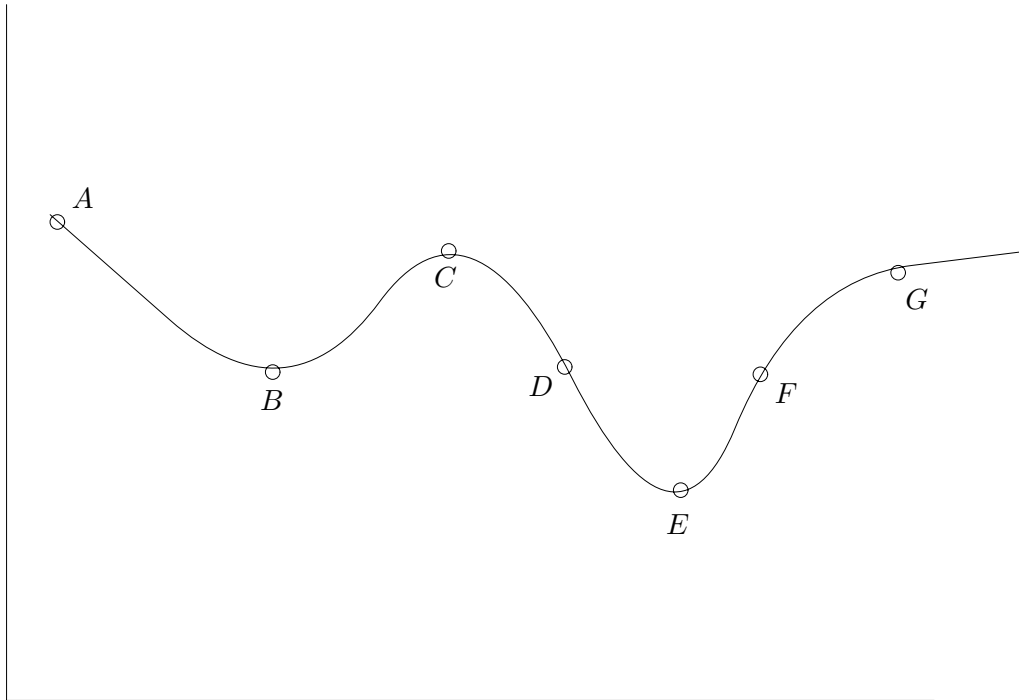
(d) Find the break even point  $q_0$

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(e) Graph  $C(q)$  and  $R(q)$  on the same axes and label the break even point.



(7) (10 Points) Let  $y = f(x)$  have the following graph.



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

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

(8) (5 Points) What is the effective annual yield of a money invested at 8% if

(a) It is compounded monthly?

\_\_\_\_\_

(b) It is compounded continuously?

\_\_\_\_\_

(9) (10 points) Let  $f(x) = (3.1)^x$ .

(a) What is the average rate of change of  $f$  on the interval from  $x = 2$  to  $x = 2.1$

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(b) What is the average rate of change of  $f$  on the interval from  $x = 2$  to  $x = 2.01$

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(c) What is a good estimate for the instantaneous rate of change of  $f$  at  $x = 2$ .

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(10) (10 points) Let  $f(x) = 2x^2 + x$  and  $g(x) = 3x - 4$ . Then compute the following

(a)  $f(-2)$

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(b)  $f(g(3))$

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(c)  $\frac{f(x+h) - f(x)}{h}$  and simplify your answer.

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