

NAME: _____

Student ID #: _____

QUIZ SECTION: _____

Math 112 B
Midterm I
April 25, 2006

Problem 1	15	
Problem 2	15	
Problem 3	20	
Total:	50	

- You are allowed to use a calculator, a ruler, and one sheet of notes.
- Your exam should contain 4 pages in total and 3 problems.
Make sure you have a complete test.
- Unless otherwise noted, you **must show how you get your answers**.
Correct (or incorrect) answers with no supporting work may result in little or no credit.
- If an algebraic method is available, answers obtained by guessing, approximating, or plug-and-check will get little or no credit.
- Write your **final answer in the indicated spaces**. Unless otherwise noted, round your answer to two decimal digits.
- If you need more room, use the backs of pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

GOOD LUCK!

Do you want me to post your grade so far on the class website under the last 4 digits of your STUDENT ID (in about a week)?

Yes, please post my grade. Sign to give permission: _____

No, please don't post my grade so far.

1) (15 points)

a) Compute the derivative $f'(x)$ of the function $f(x) = x\left(x^2 + \frac{2}{x^2}\right)$

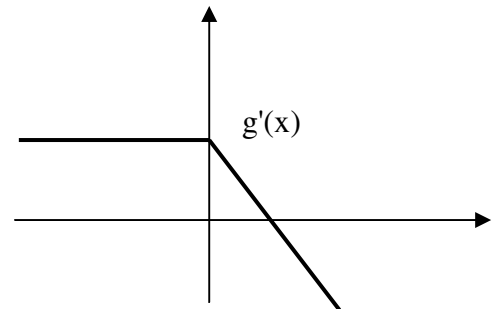
Answer: $f'(x) =$ _____

b) Compute the derivative $\frac{dy}{dt}$ of the function $y = \frac{2}{\sqrt{t}} - \sqrt[3]{t} + 0.452$

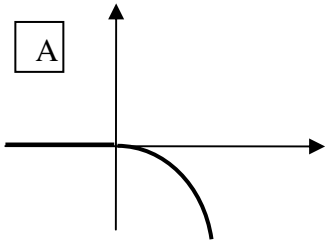
Answer: $\frac{dy}{dt} =$ _____

c) To the right you are given the derived graph $g'(x)$ of a function $g(x)$.

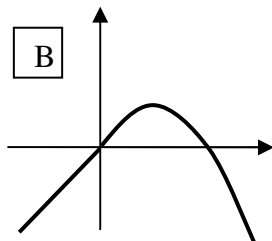
Which of the graphs labeled A through D below is the graph of the original function $g(x)$? (No need to justify your answer)



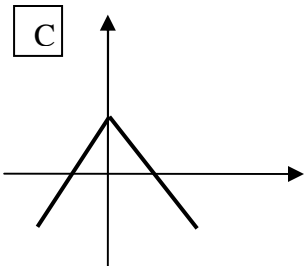
A



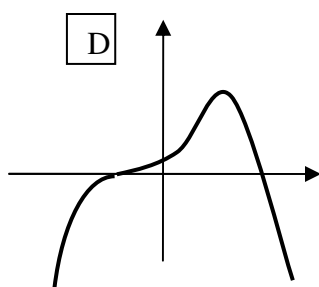
B



C



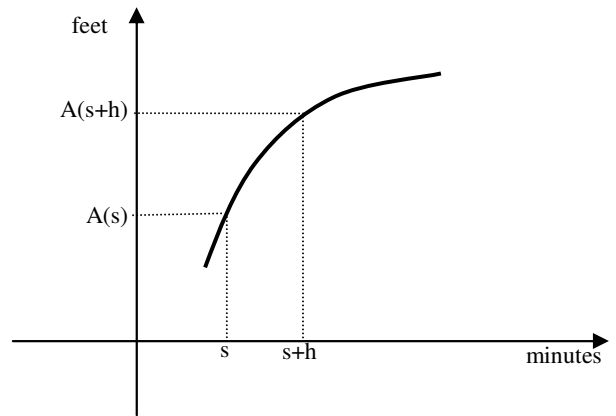
D



Answer: The graph labeled $g'(x)$ above is the derived graph of graph _____ .

2) (15 Points) To the right is a rough sketch of a portion of the graph of the altitude $A(t)$ above ground for a weather balloon. The change in the altitude of the balloon, in feet, from time $t=s$ to time $t=s+h$ is given by the formula:

$$A(s+h) - A(s) = -2sh + h^2 + 8h.$$



a) What is the average rate of change of the balloon's altitude from time $t=1$ minute to $t=2.5$ minutes?

Answer: _____ feet per minute.

b) What is the instantaneous rate of change of the balloon's altitude at time $t=2$ minutes?

Answer: _____ feet per minute.

c) If the balloon starts off at an altitude of 100 feet above ground at $t=0$, how far above ground will it be at time $t=2$ minutes?

Answer: At _____ feet.

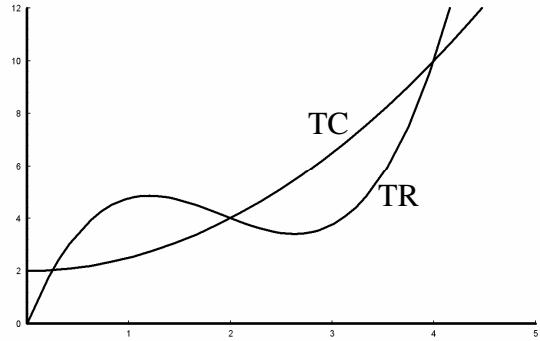
3) (20 Points)

To the right are the Total Revenue (TR) and Total Cost (TC) graphs for manufacturing and selling trinkets.

The corresponding formulas are:

$$TR(q) = q^3 - 5.75q^2 + 9.5q$$

$$TC(q) = 0.5q^2 + 2$$



where the quantity q is given in hundreds of trinkets, and both TR and TC are measured in hundreds of dollars.

- a) Find formulas in terms of q for the Marginal Revenue and the Marginal Cost.

Answer: $MR(q) =$ _____

$MC(q) =$ _____

MR and MC are measured in (circle one): *dollars* OR *hundreds of dollars*.

- b) What quantity q between 0 to 4 hundred trinkets will result in the largest profit?

Answer: Profit is maximal for $q =$ _____ hundred trinkets.

- c) Find the longest interval over which the Total Revenue is increasing but the Marginal Revenue is decreasing.

Answer: From $q =$ _____ to $q =$ _____ hundred trinkets.

- d) For what quantity q larger than 1 hundred trinkets is the Total Revenue minimal?

Answer: $q =$ _____ hundred trinkets.