

MATH 112 B, C
Exam I - Version 1
January 30, 2003

Name _____

Student ID # _____

Section _____

1	17	
2	15	
3	18	
Total	50	

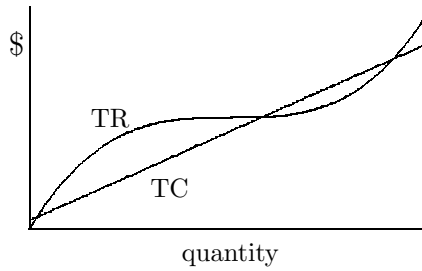
- You are allowed to use a calculator, a ruler, and one sheet of handwritten notes.
- You must show your work on all problems. The correct answer with no supporting work may result in no credit.
- Write your answers in the specified locations.
- If you need more room, use the backs of the pages and indicate to the reader that you have done so. If you still need more paper, please ask for some.
- When rounding is necessary, round your **final answer** to two digits after the decimal.
- Raise your hand if you have a question.
- Put your name on your sheet of notes and turn it in with the exam.
- You have 50 minutes to complete the exam.

GOOD LUCK!

1. (17 points) The formulas and graphs of Total Revenue and Total Cost are given below.

$$TR : TR(q) = q^3 - 15q^2 + 75q$$

$$TC : TC(q) = 20q + 10$$



- (a) (4 points) Use the derivative rules to give the formulas for Marginal Revenue and Marginal Cost.

$$MR(q) = \underline{\hspace{10cm}}$$

$$MC(q) = \underline{\hspace{10cm}}$$

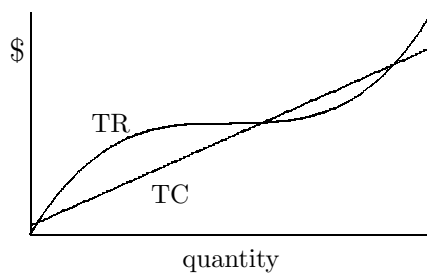
- (b) (5 points) Find all quantities at which the graph of Profit has a horizontal tangent line.

ANSWER: $q = \underline{\hspace{10cm}}$

Here are the graphs and formulas for TR and TC again:

$$TR : TR(q) = q^3 - 15q^2 + 75q$$

$$TC : TC(q) = 20q + 10$$



(c) (4 points) Average Revenue (in units of dollars per item) is given by the formula

$$AR = \frac{TR(q)}{q}.$$

Compute the Average Revenue if Total Cost is \$50.

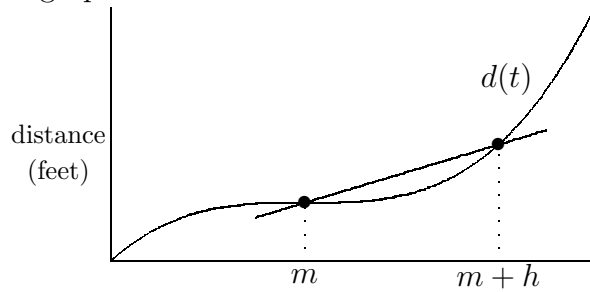
ANSWER: $AR =$ _____ dollars per item

(d) (4 points) Give an interval on which TR goes up, but MR goes down. If no such interval exists, state why.

ANSWER: from $q =$ _____ to $q =$ _____

OR (check box) No such interval exists.

2. (15 points) The graph to the right is the graph of a moving object's distance from its starting point after t seconds. We do not know the formula for the distance, but we do know that the slope of the secant line pictured is given by



$$\frac{d(m+h) - d(m)}{h} = 3m^2 + 3mh + h^2 - 24m - 12h + 48.$$

- (a) (5 points) Find the object's average (incremental) speed over the interval from $t = 2$ to $t = 5$.

ANSWER: _____ feet per second

- (b) (5 points) Find the instantaneous speed of the object at $t = 10$.

ANSWER: _____ feet per second

- (c) (5 points) How far is the object from its starting point after 15 seconds?

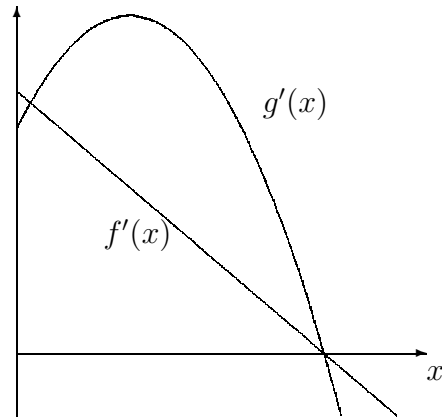
ANSWER: _____ feet

3. (18 points) To the right are the *derived* graphs of two graphs. The “original graphs” from which these graphs came are not shown. The original graphs are given by the functions:

Original graphs: $y = f(x)$ and $y = g(x)$.

The derived graphs that are shown are given by the formulas

$$f'(x) = -14x + 210 \text{ and } g'(x) = -3x^2 + 33x + 180.$$



- (a) (4 points) Find all values of x at which the graph of $f(x)$ has a horizontal tangent line.

ANSWER: $x =$ _____

- (b) (4 points) Find all values of x at which the graph of $g(x)$ has a horizontal tangent line.

ANSWER: $x =$ _____

- (c) (3 points) Give an interval on which the graph of $f(x)$ is increasing *and* the graph of $g'(x)$ is decreasing.

ANSWER: from $x =$ _____ to $x =$ _____

- (d) (3 points) Find the value of x between 0 and 20 where the value of $g(x)$ is at its highest.

ANSWER: $x =$ _____

- (e) (4 points) Find all values of x at which the tangent lines to $f(x)$ and $g(x)$ are parallel.

ANSWER: $x =$ _____