

MATH 112 A
Exam I - Version 1
April 24, 2003

Name _____

Student ID # _____

Section _____

1	16	
2	18	
3	16	
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. (16 points) Let $f(x) = x^2 - 4x + 5$.

- (a) Use the derivative rules to compute $f'(x)$ and find the slope of the tangent line to $f(x)$ at $x = 3$.

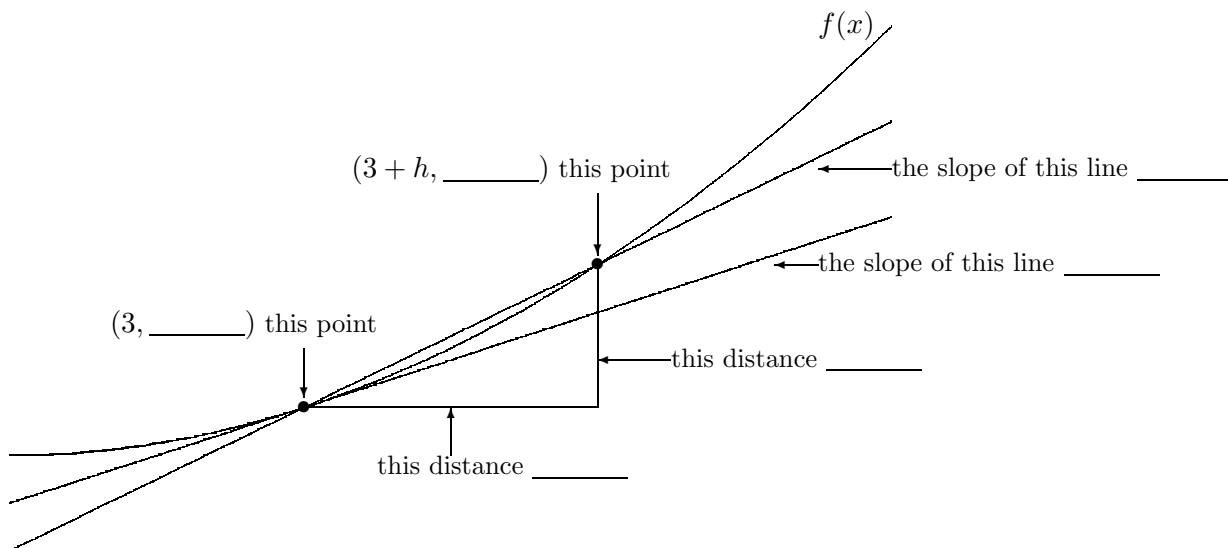
ANSWERS: $f'(x) = \underline{\hspace{2cm}}$
 slope = $\underline{\hspace{2cm}}$

- (b) Compute $\frac{f(3+h) - f(3)}{h}$, the slope of the secant line to $f(x)$ from $x = 3$ to $x = 3 + h$. Simplify your answer so that it is in the form $(\quad)h^2 + (\quad)h + (\quad)$.

ANSWER: $\frac{f(3+h) - f(3)}{h} = (\quad)h^2 + (\quad)h + (\quad)$

- (c) Choose from the following list to fill in the blanks below.

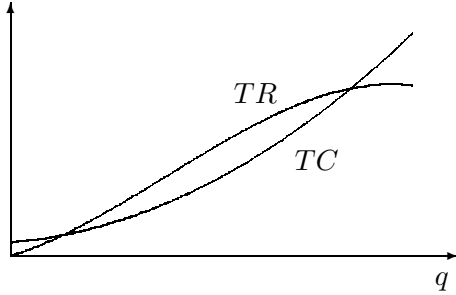
- (i) h (ii) $f(3)$ (iii) $f'(3)$
 (iv) $f(3+h)$ (v) $f(3+h) - f(3)$ (vi) $\frac{f(3+h) - f(3)}{h}$



2. (18 points) The Total Revenue and Total Cost functions for manufacturing alarm clocks are given by the following functions:

$$TR : R(q) = -\frac{1}{3}q^3 + 7q^2 + 51q \quad TC : C(q) = 4q^2 + 13q + 100,$$

where q is measured in hundreds of clocks and TR and TC are measured in hundreds of dollars. The graphs of TR and TC are given below.



- (a) Determine the quantity q at which Marginal Cost is equal to \$57.

ANSWER: $q =$ _____ hundred clocks

- (b) What is the largest value of Marginal Revenue?

ANSWER: _____ dollars

- (c) What quantity should you sell in order to receive maximum profit?

ANSWER: $q =$ _____ hundred clocks

- (d) Find the largest interval over which Total Revenue and Marginal Revenue are both increasing.

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

3. (16 points) The distance from a race car back to its starting location at time t seconds is given by a function $d(t)$, where distance is in feet. We do not know the formula for $d(t)$, but we do know the formula for the *change* in the distance from time $t = p$ to $t = p + h$:

$$d(p + h) - d(p) = 110h + 3ph + \frac{3}{2}h^2.$$

- (a) Compute the average speed of the car from time $t = 2$ to $t = 2.5$ seconds.

ANSWER: average speed = _____ feet per second

- (b) Find a formula for the change in the car's distance from time $t = 1$ to time $t = s$.

ANSWER: _____

- (c) Find a formula for the car's instantaneous speed at time $t = p$.

ANSWER: instantaneous speed = _____

- (d) Recall that the car's average trip speed at time t is given by $\frac{d(t)}{t}$. Compute the car's average trip speed at time $t = 12$ seconds.

ANSWER: average trip speed = _____ feet per second