Math 16A

Alan Weinstein, Fall 1995

First Midterm Exam, Monday, October 2, 1995

Instructions. BE SURE TO WRITE YOUR NAME AND YOUR TA'S NAME AND SECTION NUMBER ON YOUR BLUE BOOK. Read the problems very carefully to be sure that you understand the statements. All work should be shown in the blue book; writing should be legible and clear, and there should be enough work shown to justify your answers. **Indicate the final answers to problems by circling them.** [Point values of problems are in square brackets. The total point value is 45, for 15% of your course grade.]

1. [10 points]
a. Find

$$\frac{d}{dt}(pt^2 + qt + \frac{r}{t}).$$

b. Find the slope of the curve $y = x^4 + 3x^2 + 246897531$ at $x = 2$.

c. Find $f'(x)$ if $f(x) = \sqrt{1 - x^2}$. Express your answer without using fractional or negative exponents.

2. [7 points] Write a complete sentence which expresses clearly and precisely the relationship between **derivatives** and **slopes**.

3. [7 points] The number of people riding BART each weekday from Berkeley to the Powell Street station in San Francisco is thought to be a function $f(x)$ of the fare x, expressed in cents. Currently, there are $3,500$ riders daily at a fare of $1.85. It is believed that $f'(185) = -50$. Bsed on the information above, find the best estimate of the daily number of riders if the fare were raised to $1.90.

4. [6 points]
a. Find

$$\lim_{x \to 2} \frac{x^2 + 2x}{x^2 + 4}.$$

b. Find

$$\lim_{x \to 2} \frac{x^2 - 2x}{x^2 - 4}.$$

PLEASE TURN THE PAPER OVER FOR THE LAST TWO PROBLEMS.