

MATH 16A MIDTERM 2 (PRACTICE 2)
PROFESSOR PAULIN

**DO NOT TURN OVER UNTIL
INSTRUCTED TO DO SO.**

CALCULATORS ARE NOT PERMITTED

**YOU MAY USE YOUR OWN BLANK
PAPER FOR ROUGH WORK**

**SO AS NOT TO DISTURB OTHER
STUDENTS, EVERYONE MUST STAY
UNTIL THE EXAM IS COMPLETE**

**REMEMBER THIS EXAM IS GRADED BY
A HUMAN BEING. WRITE YOUR
SOLUTIONS NEATLY AND
COHERENTLY, OR THEY RISK NOT
RECEIVING FULL CREDIT**

**THIS EXAM WILL BE ELECTRONICALLY
SCANNED. MAKE SURE YOU WRITE ALL
SOLUTIONS IN THE SPACES PROVIDED.
YOU MAY WRITE SOLUTIONS ON THE
BLANK PAGE AT THE BACK BUT BE
SURE TO CLEARLY LABEL THEM**

Name and section: _____

GSI's name: _____

This exam consists of 5 questions. Answer the questions in the spaces provided.

1. (25 points) Calculate the derivatives of the following functions: (You do not need to use the limit definition and you do not need to simplify your answers)

(a)

$$\ln |x^2 + 3|$$

Solution:

(b)

$$\frac{e^{(x^3-x)}}{1-x^3}$$

Solution:

PLEASE TURN OVER

2. (25 points) A company is making and selling a product. The demand equation for a product is

$$q = 60 - 3p,$$

where p is the price per unit and q is the number of units sold. The cost of making q units is $10 + q^3$.

- (a) Determine the marginal profit function.

Solution:

- (b) If the company is making and selling 2 units, estimate, using the marginal profit, how much extra the company will profit if they make and sell 3 units.

Solution:

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3. Determine on which intervals the following function is concave up or concave down.

$$f(x) = x^2 + \frac{1}{x} + 2$$

Be sure to carefully justify your answer. Are there any inflection points?

Solution:

4. A fence is to be built which encloses a rectangular area of $20,000 \text{ ft}^2$. Fencing material costs 2.50 per foot for the north and south sides. Fencing material costs 3.20 per foot for the east and west sides. Find the cost of the least expensive fence.

Solution:

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5. Find and classify the relative extrema of the following function:

$$f(x) = \frac{e^{2x}}{x}$$

Are the results you get absolute extrema? Be sure to justify your answer.

Solution:

PLEASE TURN OVER

Solution (continued) :

END OF EXAM