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Student ID:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Section:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Instructor:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Math 2413 (Calculus I)
Extra Credit

Instructions:

- This extra credit is due at the beginning of class on Wednesday. No late work is accepted under any circumstances.

- Each question is worth 5 points.

- You must print out all the pages of this document and show your work on the space provided.

- You may discuss the problems and how to solve them ONLY with your classmates. You are NOT allowed to ask tutors or other instructors for help. You are NOT allowed to copy each other's solutions. You must write your solutions in your own words.

- **Please write neatly. If I cannot read your handwriting, you will not receive credit.**

- Simplify your answers as much as possible. Expressions such as $\ln(1)$, e^0, $\sin(\pi/2)$, etc. must be simplified for full credit.

Show all work in the space provided. Full credit will be given only if all steps are shown justifying your answer. Please write neatly and carefully, if I cannot read your handwriting, you will receive NO credit. You must write your own solutions to these problems.

1. (5 points) Find the absolute maximum and absolute minimum value of the function on the given interval

$$f(x) = \frac{x}{x^2 - x + 1}, \ [0, 3].$$

2. (5 points) Apply the first derivative test to find the open intervals on which the function is increasing or decreasing and identify all local extrema of the function on the interval $(0, 2\pi)$.

$$f(x) = \sin^2(x) + \sin(x).$$

3. (5 points) Find the intervals of concavity and the inflection point(s) of the function

$$f(x) = e^{-x^2}.$$

4. (5 points) Find the values of a and b such that the function $f(x) = axe^{bx^2}$ have a maximum at the point $(1, 2)$.