Name:_____

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 area and the dimensions of the rectangle with the largest area that can be inscribed in the ellipse: $\frac{x^2}{9} + \frac{y^2}{4} = 1$.

2. (5 points) Find the limit using L'Hopital rule $\lim_{x \to \infty} (ax)^{\frac{b}{cx}}$ where a, b, c are nonzero constants.

3. (5 points) An oil refinery is located on the north bank of a straight river that is 2 km wide. A pipeline is to be constructed from the refinery to storage tanks located on the south bank of the river 6 km east of the refinery. The cost of laying pipe is \$400000 per km over land to a point P on the north bank and \$800000 under the river to the tanks. To minimize the cost of the pipeline, where should P be located?

4. (5 points) Find the limit using L'Hopital rule $\lim_{x\to\infty}\left(1+\frac{a}{x}\right)^{bx}$ where a, b are constants.

END OF EXAM