Math 241, Exam 3, Spring, 2019

Write everything on the blank paper provided. **You should KEEP this piece of paper.** If possible: return the problems in order (use as much paper as necessary), use only one side of each piece of paper, and leave 1 square inch in the upper left hand corner for the staple. If you forget some of these requests, don't worry about it – I will still grade your exam.

The exam is worth 50 points. Each problem is worth 10 points. Please make your work coherent, complete, and correct. Please $\boxed{CIRCLE}$ your answer. Please **CHECK** your answer whenever possible.

The solutions will be posted later today.

The exams will be returned on Thursday.

No Calculators, Cell phones, computers, notes, etc.

(1) Describe and graph $y^2 - x^2 - z^2 = 1$ in three-space. What is the name of this object?

(2) Find the length of the curve $y = \frac{2}{3}x^{3/2}$ for $0 \leq x \leq 8$.

(3) Find the equation of the plane tangent to $z = x^2 + y^2$ at the point where $x = 3$ and $y = 4$.

(4) Find the absolute maximum and absolute minimum of

$$f(x, y) = 2 + 2x + 4y - x^2 - y^2$$

on the triangular region in the first quadrant bounded by the lines $x = 0$, $y = 0$, and $y = 9 - x$.

(5) Find the volume of the solid whose base in the xy-plane is the region bounded by $x + y = 2$ and $x + 4 = y^2$ and whose top is $z = x + 5$.