Math 241, Exam 3, Fall, 2017 1:15 class

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 Tuesday.

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

(1) Graph, name, describe the set of points in 3-space which satisfy $z^2 - x^2 - y^2 = 1$.

(2) The position vector of an object at time t is $\overrightarrow{\boldsymbol{r}}(t) = (3\cos t - 1)\overrightarrow{\boldsymbol{i}} + (4\sin t - 2)\overrightarrow{\boldsymbol{j}}$. Eliminate the parameter and give the path of the object.

(3) Find the equation of the plane tangent to $z = x^2 + y^2$ when $x = 3$ and $y = 1$.

(4) Find the maximum and minimum values of the function $f(x, y) = 3x + 4y$ on the circle $x^2 + y^2 = 1$.

(5) Let $f(x, y) = 2x^3y^4 \sin(3x^2y^5)$. Find $\frac{\partial f}{\partial y}$.