

Math 241, Exam 3, Fall, 2017 11:40 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 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 $x^2 + y^2 - z^2 = 1$.
- (2) The position vector of an object at time t is $\vec{r}(t) = x(t)\vec{i} + y(t)\vec{j}$, for some functions $x = x(t)$ and $y = y(t)$. Suppose

$$\vec{r}''(t) = -4\vec{j} \text{ for all } t, \quad \vec{r}'(0) = 2\vec{i} + 3\vec{j}, \quad \text{and} \quad \vec{r}(0) = 0.$$

Find the x -coordinate of the object when the y -coordinate is 1.

- (3) Find the equation of the plane tangent to $z = x^2 + y^2$ when $x = 1$ and $y = 3$.
- (4) Find the absolute maximum and minimum values 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) Let $f(x, y) = 2x^3y^4 \sin(3x^2y^5)$. Find $\frac{\partial f}{\partial x}$.