

Math 241, Exam 2, Fall, 2018

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 Thursday.

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

- (1) Describe, graph, and name  $9x^2 + 4y^2 + z^2 = 36$  in 3-space.
- (2) Do the lines

$$\begin{cases} x = 5 + t \\ y = 6 + t \\ z = 7 + t \end{cases} \quad \text{and} \quad \begin{cases} x = 7 - 2s \\ y = -7 + 3s \\ z = s \end{cases}$$

intersect? If so, where. If not, why not?

- (3) An object is fired from the origin in the  $xy$ -plane at an angle  $\alpha$  from the positive  $x$ -axis with an initial speed of  $v_0$ . The acceleration of the object is  $-g\vec{j}$ . How high is the object when its  $x$ -coordinate is  $R$ ?
- (4) Find the point on the curve

$$\vec{r}(t) = (5 \sin t)\vec{i} + (5 \cos t)\vec{j} + 12t\vec{k}$$

at a distance  $26\pi$  units along the curve from the point  $(0, 5, 0)$  in the direction of increasing arc length.

- (5) Express  $\vec{v} = 4\vec{i} + \vec{j}$  as the sum of a vector parallel to  $\vec{b} = -2\vec{i} + 3\vec{j}$  plus a vector perpendicular to  $\vec{b}$ . **Check your answer. Make sure it is correct.**