Math 241 Exam 1 Fall 2018 **Justin Wyss-Gallifent**

Directions: Do not simplify unless indicated. No calculators are permitted. Show all work as appropriate for the methods taught in this course. Partial credit will be given for any work, words or ideas which are relevant to the problem.

Please put problem 1 on answer sheet 1

1. (a) Find the center and radius of the sphere with equation $x^2 + 4x + y^2 + z^2 - 6z = 0$. [10 pts]

   (b) Show that the points $(1, 2)$, $(2, 5)$ and $(-5, 4)$ form a right triangle. [10 pts]

Please put problem 2 on answer sheet 2

2. Find the point at which the line with symmetric equation [20 pts]

$$\frac{2-x}{3} = \frac{y}{4}\ ,\ z = 5$$

   meets the plane $x + 5y - 2z = 9$.

Please put problem 3 on answer sheet 3

3. (a) Sketch the curve with the following parametrization and label the start and end points with their coordinates: [10 pts]

$$\mathbf{r}(t) = 2\cos t\,\mathbf{i} - 3\,\mathbf{j} + 5\sin t\,\mathbf{k} \text{ with } \tfrac{\pi}{2} \leq t \leq 2\pi$$

   (b) Find a parametrization of the part of the parabola $y = 4 - x^2$ in the second quadrant along with the line segment joining the endpoints. [10 pts]

Please put problem 4 on answer sheet 4

4. Suppose a curve has $\mathbf{v}(t) = 3t^2\,\mathbf{i} + 5t\,\mathbf{j} + (1-t)\,\mathbf{k}$.

   (a) Find the tangent vector $\mathbf{T}(2)$. [10 pts]

   (b) Find the tangential component of acceleration at $t = 2$. [10 pts]

Please put problem 5 on answer sheet 5

5. Find the distance between the point $(1, 2, 3)$ and the plane containing the point $(0, 0, 1)$ and the line $x = 1 + 2t$, $y = 5 - t$, $z = t$. [20 pts]

The End and the TA Section List

Avi	0311 $\leftrightarrow$ 10:00	0321 $\leftrightarrow$ 11:00
Zeynep	0312 $\leftrightarrow$ 10:00	0322 $\leftrightarrow$ 11:00
Jialin	0331 $\leftrightarrow$ 12:00	0341 $\leftrightarrow$ 1:00
Zach	0332 $\leftrightarrow$ 12:00	0342 $\leftrightarrow$ 1:00