Math 20C
Spring 2022
Midterm 1
4/22/22
Instructor : Kisun Lee
Time Limit: 50 Minutes

Name (Print): _____
PID : _____

This exam contains 5 pages (including this cover page) and 4 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and put your initials on the top of every page, in case the pages become separated.

You may *not* use your books, notes, or any calculator on this exam.

You are required to show your work on each problem on this exam. The following rules apply:

- **If you use a "fundamental theorem" you must indicate this** and explain why the theorem may be applied.
- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.
- **Mysterious or unsupported answers will not receive full credit**. A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.
- If you need more space, use the back of the pages; clearly indicate when you have done this.

Do not write in the table to the right.

Problem	Points	Score
1	10	
2	10	
3	10	
4	10	
Total:	40	

1. (10 points) Find the value of $\mathbf{c}$ that the lines $L_1(t) = \langle 2t+1, t-1, -t+4\rangle$ and $L_2(s) = \langle -5s, 2s+3, \mathbf{c}s-1\rangle$ intersect.

2. (10 points) Find an equation for the plane contains a point $P(-2, 0, 4)$ and a line $L(s) = \langle 2s + 1, -s, s - 1 \rangle$.

3. (10 points) Find a path $\mathbf{r}(t)$ parametrizing the curve obtained by intersecting $x^2 + y^2 = 9$ and $x^2 - y - z = 1$ for $y \geq 0$. **(You should find the domain of $\mathbf{r}(t)$ also)**

4. (10 points) Let $\mathbf{u}$ and $\mathbf{v}$ be vectors with $\|\mathbf{u}\| = 2, \|\mathbf{v}\| = 3$ and $\mathbf{u} \cdot \mathbf{v} = -2$.

(a) (5 points) Find the length of the vector $\mathbf{u} - \mathbf{v}$.

(b) (5 points) Find the angle between the vectors $\mathbf{u} - \mathbf{v}$ and $\mathbf{u}$.