Name:

Logistics

- The quiz is closed book, closed notes, and calculator free. No form of collaboration or help is allowed.
- The quiz is **45 minutes** long. This time includes downloading, working on, and submitting a quiz **in a PDF format via Gradescope**.
- The quiz will be available starting from **5:00 PM until midnight** on scheduled week day (Thursday).
- The quiz have **20 points** in total.
- There is **no extension or quiz retake**.
- Show your full work to receive a full credit on each problem.

1. **[5 points]** Sketch the region in $\mathbb{R}^3$ represented by the inequality

$$x^2 + y^2 \leq 9$$

2. **[5 points]** Find a unit vector that has the same direction as the given vector $-3i + 6j + 2k$.

3. **[5 points]**

   (a) Determine whether the given vectors $\langle -5, 4, -2 \rangle$ and $\langle 3, 4, -1 \rangle$ are orthogonal. *(Fully justify your answer)*

   (b) For vectors $a = 2j - 4k$ and $b = -i + 3j + k$ find the cross product $a \times b$.

4. **[5 points]**

   (a) Find an equation of the plane that goes through the point $(5, 3, 5)$ and has a normal vector $i + 4j + k$.

   (b) Use intercepts to sketch the plane from part (a).