

MOCK QUIZ, SEP 4

NAME:

0.1. **Cross Product.** Compute the following Cross Products:

$$\langle 1, 2, 1 \rangle \times \langle 1, 4, 5 \rangle$$

$$\langle 7, -1, 3 \rangle \times \langle -14, 2, -6 \rangle$$

0.2. **Lines and Planes.** Find the equation of a plane which is parallel to the plane  $2x - 2y + z = 2$  and is distance 6 away.

**0.3. Projections.** Show that  $\text{Comp}_{\vec{u}}(\vec{v} \times \vec{u}) = 0$ . (Please include both a geometric explanation, and a computation on two vectors  $\vec{v} = \langle v_x, v_y, v_z \rangle$  and  $\vec{u} = \langle u_x, u_y, u_z \rangle$  confirming your geometric explanation.)

**Bonus Problem.** *Worth no points!* Let  $F_1, \dots, F_k$  describe the faces of a polyhedron. Let  $\vec{N}_1, \dots, \vec{N}_k$  be the outward pointing normal vectors to these faces, with  $|\vec{N}_i| = \text{Area}(F_i)$ . Prove that for any vector  $\vec{b}$ , we have

$$\vec{b} \cdot \vec{N}_1 + \vec{b} \cdot \vec{N}_2 + \dots + \vec{b} \cdot \vec{N}_k = 0$$