

For full credit, you must show the steps leading from the statement of the problem to your answer. Include units in your answer.

1. For the vectors

$$\vec{v}_1 = (2, 1, -1) \quad \vec{v}_2 = (2, -1, 1) \quad \vec{v}_3 = (1, 2, 4)$$

- (a) (6 pts) Are any two of the vectors parallel?

- (b) (6 pts) are any two of three vectors perpendicular?

2. (20 pts) For $\vec{F} = (3, -1, 5)$ and $\vec{v} = (1, -2, 1)$ Find $\text{proj}_{\vec{v}}(\vec{F})$

3. (20 pts) Give a vector equation for the line in \mathbb{R}^3 that contains the point $(2, 6, -1)$ and is perpendicular to the plane given by

$$3x - 2y + z = 8.$$

4. (20 pts) Find the equation for the plane containing the points $(1, -1, 1)$, $(3, 0, 1)$, and $(1, 2, 0)$

5. (14 pts) Find the area of the triangle in \mathbb{R}^3 with vertices $p_1 = (1, 0, 0)$, $p_2 = (0, 2, 0)$ and $p_3 = (0, 0, 3)$

6. (14 pts) Find the equation of the plane that contains the line $(x, y, z) = (3, 4, 6) + t(1, 1, 1)$ and the point $(0, 2, 2)$.