

Math 251 – Test 1

October 5, 2018

Name: _____

Instructor: Patricia Wrean

Total: 25 points

1. (4 points) Give an equation in general form for the plane passing through the point $P = (3, -2, 1)$ and perpendicular to the line with the following parametric equations.

$$x = 4 - 2t, \quad y = -2 + t, \quad z = 3 - 5t$$

2. (6 points) Consider the following three points.

$$A = (0, 1, -2), \quad B = (1, 2, 1), \quad C = (-1, 2, -3)$$

- (a) Give a unit vector that is parallel to \overrightarrow{AC} .
- (b) Calculate the angle $0 \leq \theta \leq 180^\circ$ between vectors \overrightarrow{AB} and \overrightarrow{BC} .
- (c) Calculate the vector component of \overrightarrow{AC} along \overrightarrow{BC} .

3. (5 points) Calculate the distance from the point $P = (1, 0, 1)$ to the plane $x - 2y + 2z = 1$.

4. (4 points) Consider the line

$$\begin{cases} x - 2y + 2z = 3 \\ 2x - 5y + 3z = 1 \end{cases}$$

Is the vector $\mathbf{v} = \begin{bmatrix} -8 \\ -2 \\ 2 \end{bmatrix}$ parallel to this line? Explain your reasoning.

5. (6 points) Consider the system of equations below.

$$\begin{cases} x - 2y + 3z = 2 \\ x + 2y + z = 0 \\ 2x + 4z = m \end{cases}$$

For what values of m , if any, does the system have

- (a) no solutions
- (b) one solution
- (c) infinitely many solutions?