

Math 251 X01 Assignment One

Name: _____

Assignments must be completed on this paper. Marks may be deducted for not showing all your work.

1. [7 marks] Consider the line through $P = (1, -2, 3)$ with direction vector $\mathbf{d} = \begin{bmatrix} 5 \\ 4 \\ -9 \end{bmatrix}$. Find the distance from the point $A = (-6, 7, 1)$ to the line. Give an exact answer.

2. [6 marks] Find the equation of the plane through points $A = (5, -6, 4)$, $B = (2, -2, 3)$ and $C = (3, 2, -3)$.

3. [6 marks] Find the value of k that makes the three vectors coplanar (so that the three vectors lie in a common plane):

$$\mathbf{u} = \begin{bmatrix} -1 \\ 2 \\ -2 \end{bmatrix}, \mathbf{v} = \begin{bmatrix} 2 \\ -2 \\ 1 \end{bmatrix}, \mathbf{w} = \begin{bmatrix} -47 \\ k \\ -43 \end{bmatrix}.$$

4. [6 marks] Find the point of intersection of the two lines:

$$\begin{bmatrix} -7 \\ -4 \\ 10 \end{bmatrix} + s \begin{bmatrix} 1 \\ 3 \\ -1 \end{bmatrix} \text{ and } \begin{bmatrix} 11 \\ -13 \\ 13 \end{bmatrix} + t \begin{bmatrix} 2 \\ -3 \\ 1 \end{bmatrix}.$$