MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 2 **MATH 2050** WINTER 2018

Due: Monday, January 29th, 2018. SHOW ALL WORK.

> **Note:** You should complete the worksheet for Section 1.3 before you work on this assignment.

1. Consider the line ℓ with vector equation
$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ -7 \\ 5 \end{bmatrix} + t \begin{bmatrix} 3 \\ 4 \\ -1 \end{bmatrix}.$$
Find the equation of the plane which is perpendicular to ℓ and passes through the point $P(1, -2, -9)$.

2. Find an equation of the plane containing the points $A(3, 0, 1)$, $B(-2, -2, 0)$ and $C(3, -4, -3)$.

3. Find the vector and parametric equations of the line through the points $A(-7, 1, 2)$ and $B(-2, 5, 5)$.

4. For each of the following pairs of lines, find their point of intersection or show that none exists.

(a) $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ -5 \\ 2 \end{bmatrix} + t \begin{bmatrix} -6 \\ 1 \\ 4 \end{bmatrix}$ and $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 11 \\ -6 \end{bmatrix} + t \begin{bmatrix} -1 \\ 3 \\ -2 \end{bmatrix}$

(b) $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ -5 \\ 2 \end{bmatrix} + t \begin{bmatrix} -6 \\ 2 \\ 4 \end{bmatrix}$ and $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 11 \\ -6 \end{bmatrix} + t \begin{bmatrix} -1 \\ 3 \\ -2 \end{bmatrix}$

(c) $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ -5 \\ 2 \end{bmatrix} + t \begin{bmatrix} -6 \\ 2 \\ 4 \end{bmatrix}$ and $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 11 \\ -6 \end{bmatrix} + t \begin{bmatrix} 3 \\ -1 \\ -2 \end{bmatrix}$

5. Consider the planes with equations $x - y + 3z = 1$ and $x - 2y + 3z = 1$.

(a) Show that the point $(-5, 0, 2)$ lies in both planes.

(b) Find the vector equation of the line along which the two planes intersect.

6. Find the point of intersection of the line
$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 1 \\ 6 \end{bmatrix} + t \begin{bmatrix} 1 \\ 4 \\ -3 \end{bmatrix}$$
with the plane $5x - 2y - z = 3$ or show that none exists.