MEMORIAL UNIVERSITY

DEPARTMENT OF MATH & STAT

ASSIGNMENT 3 **Math 2050** FALL 2018

Due: October 5, 2018. SHOW ALL WORK

[3] 1. Find the equation of the plane that contains the point $Q(0, -1, 0)$ and is parallel to the plane $2x + y - z = 0$.

[3] 2. Find a vector of length 2 orthogonal to the plane $x + z = 5$.

3. Consider the points A(0, 1, 0), B(-1, 0, 0) and C(0, 0, 1).

[5] (a) Find the equation of the plane passing through A, B, and C.

[3] (b) Find the area of the triangle ABC.

[5] 4. Find the equation of the line of intersection of the planes $3x + y - 2z = 1$ and $x + 2y - z = -3$.

[5] 5. Find all points (if any) of the intersection of the plane $x - y + z = 1$ and the line $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 3 \\ 0 \end{bmatrix} + t \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$

6. Consider the lines with equations $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix} + t \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} + s \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$

[1] (a) Are the lines parallel? justify your answer.

[5] (b) Determine whether or not the lines intersect. Find the point of intersection (if it exists).

[5] 7. Let $\mathbf{u} = \begin{bmatrix} -2 \\ 3 \\ 0 \end{bmatrix}, \mathbf{v} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $\mathbf{w} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$. Compute $(\mathbf{u} \times \mathbf{v}) \times \mathbf{w}$ and $\mathbf{u} \times (\mathbf{v} \times \mathbf{w})$. Should the answers be the same?

[5] 8. Find the equation of the plane containing both lines $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix} + t \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} + s \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$

[40]