

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 1

MATH 2050

WINTER 2018

Due: Monday, January 22nd, 2018. SHOW ALL WORK.

Note: You should complete the worksheets for Sections 1.1 and 1.2 before you work on this assignment.

- Determine all values of x , if any, for which the vectors $\begin{bmatrix} 9 \\ x^2 \\ 2x \end{bmatrix}$ and $\begin{bmatrix} 6 \\ 24 \\ -8 \end{bmatrix}$ are parallel.
- Express $\begin{bmatrix} 5 \\ 0 \end{bmatrix}$ as a linear combination of $\begin{bmatrix} 7 \\ -1 \end{bmatrix}$ and $\begin{bmatrix} -3 \\ 4 \end{bmatrix}$ or show that no such combination exists.
- Express $\begin{bmatrix} 4 \\ 0 \\ -6 \end{bmatrix}$ as a linear combination of each set of vectors or show that no such combination exists.
 - $\begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$, $\begin{bmatrix} 0 \\ 4 \\ 2 \end{bmatrix}$, $\begin{bmatrix} -5 \\ 2 \\ -1 \end{bmatrix}$
 - $\begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$, $\begin{bmatrix} 0 \\ 4 \\ 2 \end{bmatrix}$, $\begin{bmatrix} -6 \\ 8 \\ 1 \end{bmatrix}$
- Consider the points $A(1, 0, 4)$ and $B(4, 3, -2)$.
 - Compute the vector \overrightarrow{AB} .
 - Use \overrightarrow{AB} to find the coordinates of the point C which lies exactly one-third of the way along the line from A to B .

PLEASE TURN OVER

5. Consider the vector $\mathbf{u} = \begin{bmatrix} -1 \\ -4 \\ 8 \end{bmatrix}$.

- (a) Determine the unit vector that lies in the direction of \mathbf{u} .
- (b) Determine a vector of length 6 which lies in the opposite direction to \mathbf{u} .

6. Find all values of x for which $\begin{bmatrix} 3x \\ x \\ -1 \end{bmatrix}$ and $\begin{bmatrix} 2 \\ x \\ -x \end{bmatrix}$ are orthogonal.

7. If \mathbf{u} and \mathbf{v} are unit vectors, find the angle which lies between them if the vector $\mathbf{u} - 5\mathbf{v}$ is orthogonal to the vector $\mathbf{v} - 3\mathbf{u}$.