MEMORIAL UNIVERSITY OF NEWFOUNDLAND DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 8 MATH 2050 DUE AUG 2

For practice and extra credit only.

1. Consider an arbitrary quadrilateral in a plane. Connect the midpoints of its sides to get a new quadrilateral. What do you notice about this new quadrilateral? Prove you conjecture using addition of vectors.

Hint: start from looking at midpoints of various squares and rectangles and then take a more general quadrilateral.

2. Find whether two lines with direction vectors $\begin{bmatrix} 1\\2\\3 \end{bmatrix}$ and $\begin{bmatrix} -1\\3\\3 \end{bmatrix}$ respectively intersect

at a point if it is known that the first line goes via point (0,-2,4) and the second via point (1,1,2).

- 3. Write equation of line going via points (1,2) and (4,5). Does point A belong to the line? If not, what is the distance from the point to the line?
 - a) A(11,12)
 - b) A(5,7,9)

4. Find the projection of vector
$$\vec{v} = \begin{bmatrix} 2\\ -5\\ 7 \end{bmatrix}$$
 onto vector $\vec{u} = \begin{bmatrix} 2\\ 1\\ 3 \end{bmatrix}$.

Find the angle between the vectors.

5. Consider triangle with vertices at points

$$(1, -1, 1), (3, -6, 8), (1, -2, 4),$$

- (a) find the area of the triangle
- (b) find equation of the plane to which the triangle belongs.
- 6. Give an example of a plane which is orthogonal to the plane 7x y 4z = 6.
- 7. Give an example of a line which is orthogonal to the vector $\begin{bmatrix} 1\\ -2\\ 5 \end{bmatrix}$. Explain.