Math 253 Assignment 3- Fall 2020
Due: Saturday, September 19, 2020 no later than 10pm

You are expected to carefully write your assignment, including any associated work or explanations, clearly on lined paper. Leave space between two problems for comments to be made and keep the problems in the order they were given to you. What is to be uploaded into Moodle should be a freshly written copy (no crossing out or messy scratch), and then **scanned into a single pdf document**. (If your handwriting is very light you may need to use a pen for the final copy so it is readable!) The procedure for scanning (which can be done from any smart phone) is given to you in Moodle. Please read the instructions over and try it once before you need to scan your assignment. Save the assignment with your name on it, somewhere you will be able to retrieve it such as your computer before you upload it into Moodle.

(1) (10 points) Consider the following points in the plane, A(-4, 5), (B(7, 3), C(2, -1), D(1, 6)

(i) Write each of the vectors below in both component form and as sums using standard unit vectors.

$\overrightarrow{AC}$ $\overrightarrow{BD}$
$\overrightarrow{CB}$ $\overrightarrow{DA}$

(ii) Find the following vectors in component form:

$4\overrightarrow{AB} + 3\overrightarrow{CD}$ $\overrightarrow{BC} - 2\overrightarrow{AD}$ $-2\overrightarrow{BA} + \overrightarrow{AC}$

(iii) On Graph paper show the vectors $\overrightarrow{AC}$, $\overrightarrow{BD}$ (not the equivalents that start at (0,0)), and draw the vectors that will show haw to add and subtract $\overrightarrow{AC} + \overrightarrow{BD}$, $\overrightarrow{AC} - \overrightarrow{BD}$ geometrically. Be sure to label the appropriate vectors.

(2) (10 points) Consider the points in space, A(-3, 1, -2), (B(5, -2, -1), C(3, -1, 0), D(1, 4, 3).

(i) Write each of the vectors below in both component form and as sums using standard unit vectors.

$\overrightarrow{AC}$ $\overrightarrow{BD}$ $\overrightarrow{CB}$

(ii) Find the following vectors in component form:

$4\overrightarrow{AB} + 3\overrightarrow{CD}$ $\overrightarrow{BC} - 2\overrightarrow{AD}$ $-2\overrightarrow{BA} + \overrightarrow{AC}$

(3) (10 points) Given the following vectors, $\vec{r} = \langle 3, -5 \rangle$, $\vec{t} = \langle 7, 5 \rangle$, $\vec{b} = \langle -4, -1 \rangle$, $\vec{c} = -\vec{i} + 2\vec{j} - 4\vec{k}$, $\vec{m} = 2\vec{i} - 3\vec{j} - 2\vec{k}$.

(i) Calculate:

$||\vec{r}||$ $||\vec{t} + 2\vec{s}||$ $||\vec{m}||$

$\vec{s} \bullet \vec{b}$ $(\vec{r} \bullet \vec{b})$ - $(\vec{b} \bullet \vec{t})$ $\vec{c} \bullet 3\vec{m}$

(ii) Find each of the following:

The angle between $\vec{r}$ and $\vec{t}$.

A vector that is orthogonal to $\vec{m}$.

(iii) Explain in complete sentences why we cannot consider the dot product an actual multiplication on the set of vectors in the Plane.