# Assignment #3

## Submission Date: *April 21 2022*

Implement a class vector in C++. This class stores components of a vector and its dimension. Components should be stored in a dynamic array of size equal to its dimension. For example if a vector is a three dimensional vector then there will be three components of this vector. Use operator overloading for the following functions.
*Overload stream insertion and stream extraction operators (<<, >>) for output and input of the vector*
*Calculate unit vector (use operator ^ and it should be capable of cascaded function calls)*
*Calculate dot product of two vectors (Use operator *)*
*Assign one vector to another vector (it should be capable of cascaded function calls)*
*Compare two vectors for the operators: == and != (two vectors are equal if their corresponding components are equal and not equal otherwise)*
Overload subscript operator[] for read and write operation on the individual components if 0<=i< size, where i is the component number and size is the total number of components in the vector.
You are also required to implement the copy constructor and destructor for this class.

## Input and output Format
Dimension: 4
Vector: <3.2  15  4  8.5>

## Dot Product
Dot product of two vectors is the summation of the multiplication of corresponding components of two vectors. For example the dot product of the following vectors is
<2 3 4> * <3 6 9>
2*3 + 3*6 + 4*9 = 60

## Unit vector
Unit vector is a vector with same direction and unit magnitude. Unit vector is calculated by dividing each component of a vector by its magnitude. Magnitude is calculated as the square root of the sum of squares of all components of a vector.
For example if you have a vector
< 3 4 6>
Then the magnitude of this vector is
$$\sqrt{3^2 + 4^2 + 6^2}$$
$$\sqrt{9 + 16 + 36}$$
$$\sqrt{61}$$
And the unit vector will be
$$\frac{3}{\sqrt{61}} + \frac{4}{\sqrt{61}} + \frac{6}{\sqrt{61}}$$