**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

2 2 2 3 4 6

+ +

9 16 36

+ +

61

And the unit vector will be

3 4 6

+ +

61 61 61