AMA2222 Lab 12 (week 13)

12)
A vector $\vec{v}$ in three-dimensional space can be represented in either of the following:

(x, y, z) or $x\hat{\imath} + y\hat{\jmath} + z\hat{k}$ or $\begin{pmatrix} x \\ y \\ z \end{pmatrix}$

That consists of the x-, y- and z- coordinates with real values. Using this, we can define 3D vector as a class called `vector`.

Within the class `vector`, we can define a double function called `magnitude()` that returns the magnitude of the vector by calling `v.magnitude()`

$$\|\vec{v}\| = \sqrt{x^2 + y^2 + z^2}$$

We can also define a double function called `dot(vector)` that returns the dot product of the vector v1 with another input vector v2, by calling `v1.dot(v2)`

$$\overrightarrow{v_1} \cdot \overrightarrow{v_2} = x_1 x_2 + y_1 y_2 + z_1 z_2$$

We can also define a void function called `printv()` that display the vector in the form of (x, y, z) on the screen by calling `v.printv()`

Within the class `vector`, we define the $+$ operator that perform addition of two vectors by calling `v1+v2`, the result is also a vector.

$$\overrightarrow{v_1} + \overrightarrow{v_2} = (x_1 + x_2, y_1 + y_2, z_1 + z_2)$$

We can also define the $-$ operator that perform subtraction of two vectors by calling `v1-v2`, the result is also a vector.

$$\overrightarrow{v_1} - \overrightarrow{v_2} = (x_1 - x_2, y_1 - y_2, z_1 - z_2)$$

Write a class called `vector` that contains a constructor and all the above functions and operators. Then write a program making use of `vector` to perform the following task in the example (correct to 2d.p.):

```
Enter the coordinates of vector v1: 2 -2 1
Enter the coordinates of vector v2: -3 1 0
The magnitude of v1 is 3.00
The magnitude of v2 is 3.16
v1 + v2 = (-1.00, -1.00, 1.00)
v1 – v2 = (5.00, -3.00, 1.00)
```