CS151 Spring 2020

Project 9

3d vectors

Three dimensional vector can be represented as a triple (x, y, z), where x, y, z are real numbers.

The operations to add, subtract and multiply two vectors are defined as follows:

Addition: (x1, y1, z1) + (x2, y2, z2) = (x1 + x2, y1 + y2, z1 + z2)

Subtraction: (x1, y1, z1) - (x2, y2, z2) = (x1 - x2, y1 - y2, z1 - z2)

Dot Product: (x1, y1, z1) \* (x2, y2, z2) = x1\*x2 + y1\* y2 + z1\* z2

**NOTE: Result of vector addition and subtraction is a vector while dot product is a real number.**

Design an application with two classes.

Class Vector3d has three member variables x, y, and z.

It has two constructors.

The first one accepts three double parameters which are used to initialize x, y, and z.

The second one does not take any parameter and initializes x, y, and z to 0.

The following three methods can add, subtract, or multiply the vector with the vector other that is in the parameter list.

public Vector3d add(Vector3d other)

public Vector3d subtract(Vector3d other)

public double dotProduct(Vector3d other)

Class Vector3d has also getter methods to get x, y, and z, and method toString that returns string representation of 3d vector ( x = …., y = …, z = … ).

Class Vector3dTester has main method. Instantiate four 3d vectors v1=(1,2,3), and v2=(3,-1,2), v3, and v4 (v3 and v4 initial values will be your choice). Apply all three operations on v1 and v2 and display result using toString method.

Do the same for v3 and v4.

Follow instruction for the previous projects.