Assignment 03 – Due on 03/12/25, 11.59pm

Question 1

Write a java program that achieves the rotation of a *unit cube* about an *arbitrary fixed point* (page 79 - first special case of 3D rotation). Produce only *text output* for this program (similar to *Rota3DTest* demo program shown in class). Output should display the *desired angle of rotation, principle axis of rotation,* and the *arbitrary point* used for rotating the unit cube. Output should also display the vertices of the unit cube along with their co-ordinate values *before* and *after* the 3D rotation.

The program should take 5 command-line arguments for the three customizable parameters - arbitrary point A (a1, a2, a3), desired angle of rotation alpha, and the principle axis of rotation (x_axis, y_axis, or z_axis). In other words, after compiling your program, you may run it by typing the following as an example:

java Rota3DCube 2 2 2 45 y_axis

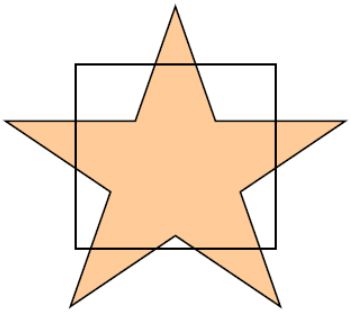
where a1 = 2, a2 = 2, a3 = 2, alpha = 45 degrees, and y_axis is the principle axis of rotation.

Note:

- The initial vertices of the cube before rotation should be -
  [[0, 0, 0], [1 , 0 , 0], [1 , 0 , 1], [0 , 0 , 1],
  [0 , 1 , 1], [1 , 1 , 1], [1 , 1 , 0], [0 , 1 , 0]]
- Name the main java file as Rota3DCube.java

Question 2

Using *Sutherland-Hodgman polygon clipping algorithm*, explain all the steps involved in clipping the below polygon (follow class example).



Instructions for Submission:

Refer to page 2 for submission instructions

1. Place the written Java source program for question 1, the solution for question 2 (in a pdf document only) and any required files from the grjava3e folder, for successful running of question1 in a single folder. (Do not include compiled .class files)
2. In the main java file for question1, remove package name (if any) at the start of code, while submitting. Ensure class name and the file name matches for successful running of the script.
3. Inside the folder, verify if the following commands work
    a. javac Rota3DCube.java
    b. java Rota3DCube 2 2 2 45 z_axis
       or java Rota3DCube.java 2 2 2 45 z_axis (depending on the os)
4. Zip the folder as firstname_lastname.zip (with an underscore) (e.g.jason_smith.zip). Submit your ZIP file via eLearning by the deadline.

Refer to page 2 for submission instructions