1. Program to recursively subdivide a tetrahedron to from 3D Sierpinski gasket. The number of recursive steps is to be specified by the user

```c
#include <stdlib.h>
#include <stdio.h>
#include <GL/glut.h>

  float point v[][3]={{0.0, 0.0, 0.0}, {0.0, 1.0, -1.0},{-1.0, -1.0, -1.0},
  {1.0, -1.0, -1.0}};
int n;

void triangle( point a, point b, point c)
{
   glBegin(GL_POLYGON);
glVertex3fv(a);
     glVertex3fv(b);
     glVertex3fv(c);
   glEnd();
}

void divide_triangle(point a, point b, point c, int m)
{
   point v1, v2, v3;
   int j;
   if(m>0)
   {
     for(j=0; j<3; j++) v1[j]=(a[j]+b[j])/2;
     for(j=0; j<3; j++) v2[j]=(a[j]+c[j])/2;
     for(j=0; j<3; j++) v3[j]=(b[j]+c[j])/2;
     divide_triangle(a, v1, v2, m-1);
     divide_triangle(c, v2, v3, m-1);
     divide_triangle(b, v3, v1, m-1);
   }
   else(triangle(a,b,c)); /* draw triangle at end of recursion */
}


void tetrahedron( int m)
{
 glColor3f(1.0,0.0,0.0);
   divide_triangle(v[0], v[1], v[2], m);
 glColor3f(0.0,1.0,0.0);
   divide_triangle(v[3], v[2], v[1], m);
 glColor3f(0.0,0.0,1.0);
```

```c
    divide_triangle(v[0], v[3], v[1], m);
 glColor3f(0.0,0.0,0.0);
    divide_triangle(v[0], v[2], v[3], m);
}
void display(void)
{
    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
 glLoadIdentity();
    tetrahedron(n);
    glFlush();
}

void myReshape(int w, int h)
{
   glViewport(0, 0, w, h);
   glMatrixMode(GL_PROJECTION);
   glLoadIdentity();
   if (w <= h)
      glOrtho(-2.0, 2.0, -2.0 * (GLfloat) h / (GLfloat) w,
         2.0 * (GLfloat) h / (GLfloat) w, -10.0, 10.0);
   else
      glOrtho(-2.0 * (GLfloat) w / (GLfloat) h,
         2.0 * (GLfloat) w / (GLfloat) h, -2.0, 2.0, -10.0, 10.0);
   glMatrixMode(GL_MODELVIEW);
}

void main(int argc, char **argv)
{
 printf(" Enter the Number of Divisions ? ");
 scanf("%d",&n);
   glutInit(&argc, argv);
   glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB | GLUT_DEPTH);
   glutInitWindowSize(500, 500);
   glutCreateWindow("3D Gasket");
   glutReshapeFunc(myReshape);
   glutDisplayFunc(display);
 glEnable(GL_DEPTH_TEST);
   glClearColor (1.0, 1.0, 1.0, 1.0);
   glutMainLoop();
}
```

OUTPUT :

Enter the Number of Divisions ? 4

3D Gasket