Labset 4

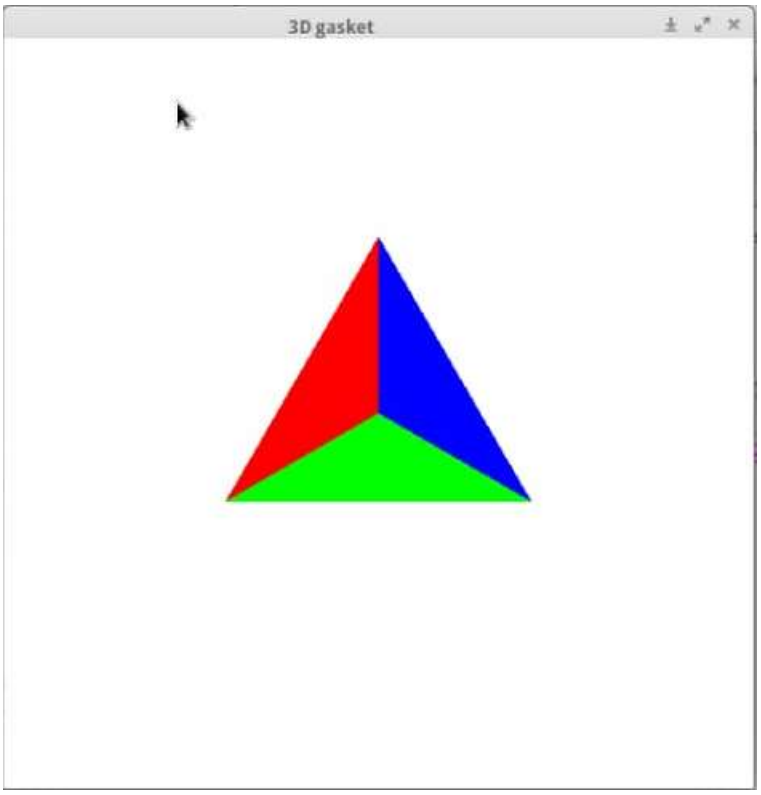
Write a recursive program to construct a 3D Serpinski gasket with polygons.

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

typedef float point[3];
point v[]={{0.0,0.0,1.0},{0.0,0.942809,-0.333333},{-
0.816497,0.471405,-0.333333}, {0.816497,-0.471405,-0.333333}};
int n;

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

void midpoint(point save,point a,point b)
{
    save[0]=(a[0]+b[0])/2;
    save[1]=(a[1]+b[1])/2;
    save[2]=(a[2]+b[2])/2;
}

void divide_tetrahedron(point a, point b, point c, point d, int m)
{
    point ab, ac, ad, bc, bd, cd;
    if(m>0)
    {
        midpoint(ab, a, b);
        midpoint(ac, a, c);
        midpoint(ad, a, d);
        midpoint(bc, b, c);
        midpoint(bd, b, d);
        midpoint(cd, c, d);
        divide_tetrahedron(a, ab, ac, ad, m-1);
        divide_tetrahedron(ab, b, bc, bd, m-1);
        divide_tetrahedron(ac, bc, c, cd, m-1);
        divide_tetrahedron(ad, bd, cd, d, m-1);
    }

    else
    {
        glColor3f(1.0,0.0,0.0);
        draw_triangle(a,b,c);
        glColor3f(0.0,0.0,1.0);
        draw_triangle(a,c,d);
```

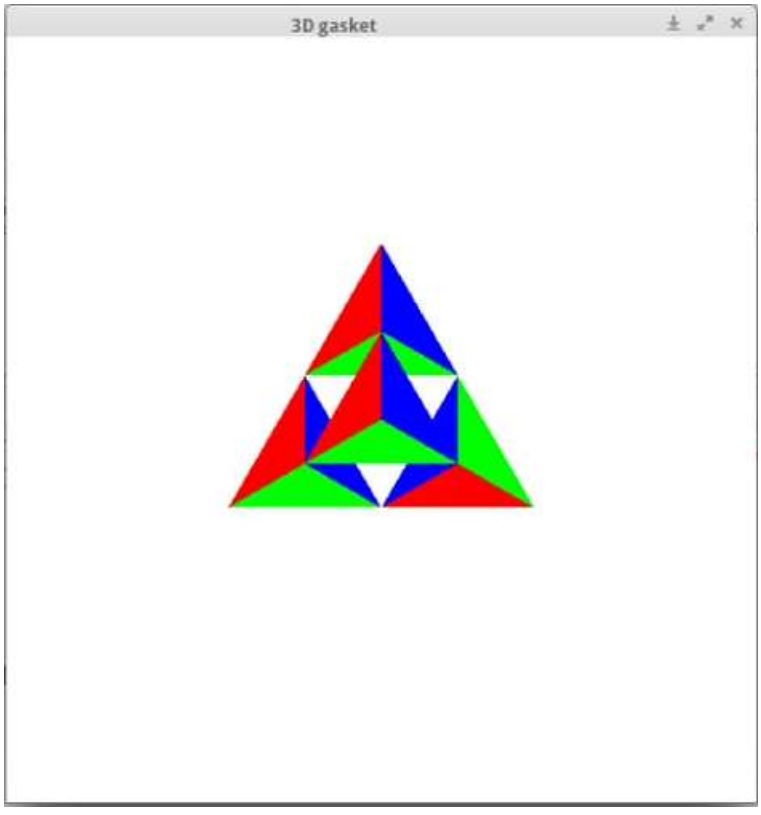
```
        glColor3f(0.0,0.0,0.0);
        draw_triangle(c,b,d);
        glColor3f(0.0,1.0,0.0);
        draw_triangle(a,b,d);
    }
}

void display(void)
{
    glClear(GL_COLOR_BUFFER_BIT|GL_DEPTH_BUFFER_BIT);
    glLoadIdentity();
    divide_tetrahedron(v[0],v[1],v[2],v[3],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);
    glutPostRedisplay();
}

int 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("3DGasket");
    glutReshapeFunc(myReshape);
    glutDisplayFunc(display);
    glEnable(GL_DEPTH_TEST);
    glClearColor(1.0,1.0,1.0,1.0);
    glutMainLoop();
    return 0;
}
```

Output:

1. Enter number of divisions: 0



2. Enter number of divisions: 1



3. Enter number of divisions: 2