CS 392 Project 1: 3D Fractals

Due Tuesday, September 16

Fractals are generated figures which can be highly complex, but are created using algorithms which are somewhat simplistic. For this project, write a program that uses a Python script in Blender to generate a Pyramid fractal.

The Pyramid Fractal

The pyramid fractal is produced by subdividing a pyramid into 5 smaller pyramids, and then subdividing each smaller pyramid, continuing until a depth limit is reached. This is a recursive fractal. That is, a fractal generated using an algorithm which includes itself as a potential step.

In general, your program will look something like this:

```
Set up initial pyramid

def subdivide(big_pyramid, subdivisions_remaining)
    if subdivisions_remaining < 1:
        draw big_pyramid
    Create 5 small pyramids based on big_pyramid
    for each small pyramid:
        subdivide(the small pyramid, subdivisions_remaining - 1)

subdivide(initial pyramid, number of subdivisions)
```

Obviously the above is not correct Python code, and some of the steps require some elaboration. A pyramid consists of 5 points: A top, and four lower corners. To draw a pyramid, draw lines along each edge. Look at the `curve` object in vpython for line drawing. To find a point midway between two other points (for example, between the top point and one of the lower corners) average each of the three values that describes the point.

The number of subdivisions will be limited by your computer's capacity. If you call `primitive_cylinder_add` to add lines, it'll be a lot less than if you create a custom mesh like in the example `worm_mesh.py`.

Grading

Your program must have an easy way to change the number of subdivisions, and it must support as many subdivisions as available processing power will support. Upload the program and an example pyramid on Canvas.