

### Homework 3: Transformations

The assignment given was to develop many various transformations for the given polygon (a teapot) in the data file called tris.txt. The purpose of the transformations is to modify the visuals of the teapot from its default perspective: rotate, stretch, translate across an axis, etc.

The algorithms used were all based on existing opengl algorithms as instructed. The general idea is to load the polygon into memory, apply the matrix math to the data to produce the desired transformation, then print the newly transformed polygon to imagine for the user. LookAt effectively moves and rotates the viewport (camera) to “look at” a point in space by calculating what the calling function wishes to see with it’s “eye” and applying the new data to the transformation matrix. Translate is a basic sliding movement within space. Rotate is a basic rotation by a set degree angle that must be calculated via trigonometric math and then applied to the matrix data. Scale is a simple size change by multiplying the data by some coefficient. The Perspective function simply assigns a new perspective given a specified field of view, an aspect ratio, and view distance by applying the parameters to the matrix data: the field of view and aspect ratio used to calculate the peripheral range of what is viewable and the view distance to decide if the polygon is within viewing range. The Orthographic function will assign an “orthographic” view to the projection matrix by calculating an exact diagonal viewport to the polygon: this is accomplished by assuming an exact rotational angle and simply applying it to the projection matrix.

Implementation was simply a matter of developing each transformation as per spec and running them against the data in matrix memory.

The resulting images produced follow expectations. Given the transformations specified in the main.cpp file, the results can be seen below.

