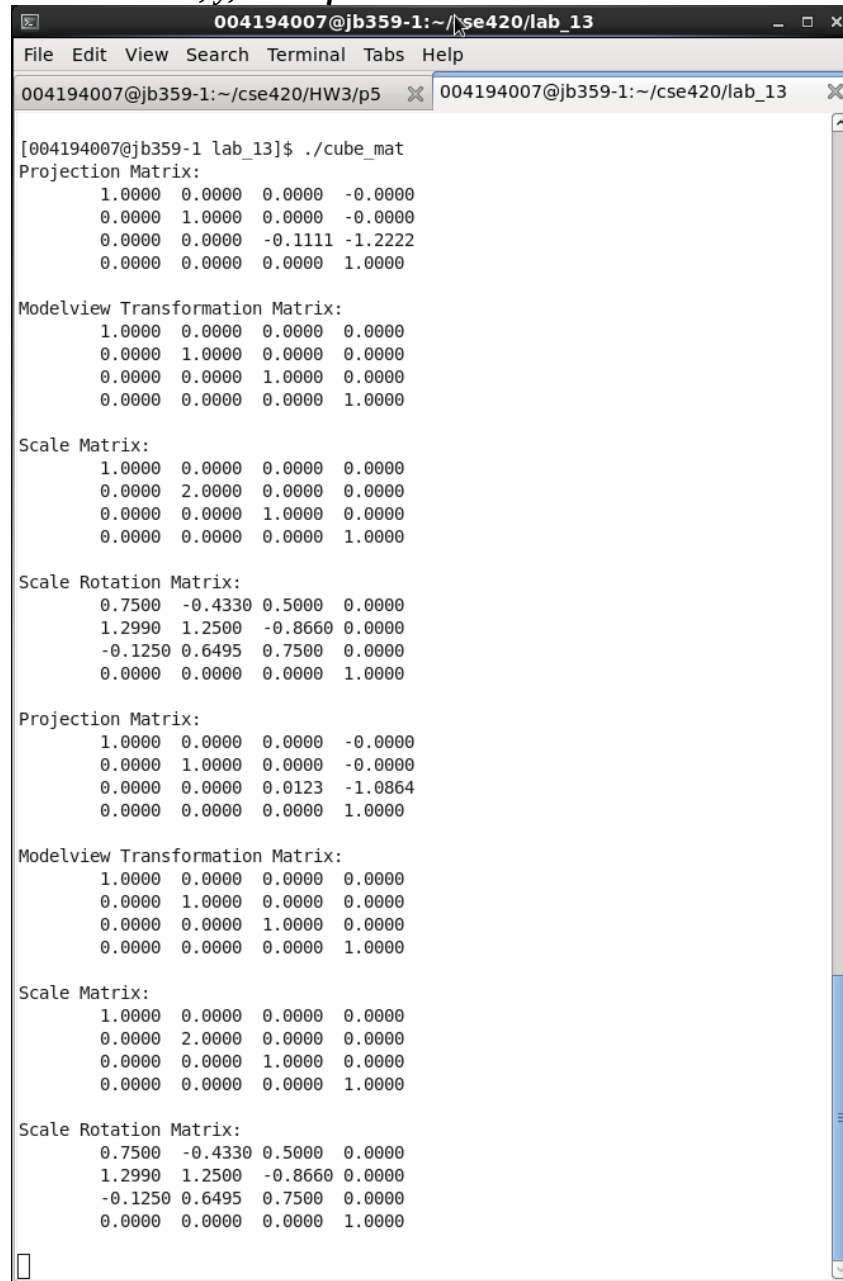


Yazhuo Liu
Lab 13

Try different projection and modelview transformations (translation, rotation, and scaling) and examine the outputs to check if they are consistent with what you expect. In particular, try the rotation transformations about x, y, z axis for 30.



```
004194007@jb359-1:~/cse420/lab_13
File Edit View Search Terminal Tabs Help
004194007@jb359-1:~/cse420/HW3/p5 004194007@jb359-1:~/cse420/lab_13

[004194007@jb359-1 lab_13]$ ./cube_mat
Projection Matrix:
    1.0000    0.0000    0.0000   -0.0000
    0.0000    1.0000    0.0000   -0.0000
    0.0000    0.0000   -0.1111  -1.2222
    0.0000    0.0000    0.0000    1.0000

Modelview Transformation Matrix:
    1.0000    0.0000    0.0000    0.0000
    0.0000    1.0000    0.0000    0.0000
    0.0000    0.0000    1.0000    0.0000
    0.0000    0.0000    0.0000    1.0000

Scale Matrix:
    1.0000    0.0000    0.0000    0.0000
    0.0000    2.0000    0.0000    0.0000
    0.0000    0.0000    1.0000    0.0000
    0.0000    0.0000    0.0000    1.0000

Scale Rotation Matrix:
    0.7500   -0.4330    0.5000    0.0000
    1.2990    1.2500   -0.8660    0.0000
   -0.1250    0.6495    0.7500    0.0000
    0.0000    0.0000    0.0000    1.0000

Projection Matrix:
    1.0000    0.0000    0.0000   -0.0000
    0.0000    1.0000    0.0000   -0.0000
    0.0000    0.0000    0.0123  -1.0864
    0.0000    0.0000    0.0000    1.0000

Modelview Transformation Matrix:
    1.0000    0.0000    0.0000    0.0000
    0.0000    1.0000    0.0000    0.0000
    0.0000    0.0000    1.0000    0.0000
    0.0000    0.0000    0.0000    1.0000

Scale Matrix:
    1.0000    0.0000    0.0000    0.0000
    0.0000    2.0000    0.0000    0.0000
    0.0000    0.0000    1.0000    0.0000
    0.0000    0.0000    0.0000    1.0000

Scale Rotation Matrix:
    0.7500   -0.4330    0.5000    0.0000
    1.2990    1.2500   -0.8660    0.0000
   -0.1250    0.6495    0.7500    0.0000
    0.0000    0.0000    0.0000    1.0000
```

```
void display(void)
{
    float p[4][4];
    double pd[4][4];

    glClear (GL_COLOR_BUFFER_BIT);
    glColor3f (0.0, 1.0, 0.0);    //green color
```

```

glLoadIdentity ();          // clear the matrix
glMatrixMode (GL_PROJECTION);
                           // viewing transformation
// glFrustum (-1.0, 1.0, -1.0, 1.0, 2.0, 20.0);
// gluPerspective ( 53, 1, 2, 20 ); //tan 26.5 = 1/2.0
glOrtho (-1.0, 1.0, -1.0, 1.0, 2.0, 20.0);
// gluLookAt (0.0, 0.0, 5.0, 0.0, 0.0, 0.0, 1.0, 0.0);

glMatrixMode (GL_MODELVIEW);
glLoadIdentity();
glGetFloatv(GL_PROJECTION_MATRIX,&p[0][0]);
cout << "Projection Matrix:" << endl;
print_mat ( p );
glGetDoublev(GL_MODELVIEW_MATRIX, &pd[0][0]);
cout << "Modelview Transformation Matrix:" << endl;
print_mat ( pd );
glScalef (1.0, 2.0, 1.0);    // modeling transformation

glGetFloatv(GL_MODELVIEW_MATRIX,&p[0][0]);
cout << "Scale Matrix:" << endl;
print_mat ( p );

glRotatef ( 30, 1, 0, 0 );
glRotatef ( 30, 0, 1, 0 );
glRotatef ( 30, 0, 0, 1 );
glGetDoublev(GL_MODELVIEW_MATRIX, &pd[0][0]);
cout << "Scale Rotation Matrix:" << endl;
print_mat ( pd );
glutWireCube (1.0);

glFlush ();
}

```

What is the composite transformation matrix of an x-roll of 20°, followed by a y-roll of 30°, and a z-roll of 40°?

$$\begin{array}{rcl}
 \text{Rx}(20^\circ) \cdot \text{Ry}(30^\circ) \cdot \text{Rz}(40^\circ) = & \begin{matrix} 0.663 & -0.557 & 0.5 & 0 \\ 0.735 & 0.61 & -0.3 & 0 \\ -0.14 & 0.564 & 0.814 & 0 \\ 0 & 0 & 0 & 1 \end{matrix}
 \end{array}$$

4. No, they are not the same.

Report:

I completed this lab.