

Lab 1 Graphics

Code description:

➤ For sphere:

- ❖ I just add this part to draw the second half of sphere by change the sign of y axis in equations

```
glBegin(GL_TRIANGLE_STRIP);
for (i = 0; i <= p; i++)
{
    glVertex3f(R * cos((float)(j + 1) / q * M_PI / 2.0) * cos(2.0 * (float)i / p * M_PI),
        -R * sin((float)(j + 1) / q * M_PI / 2.0),
        -R * cos((float)(j + 1) / q * M_PI / 2.0) * sin(2.0 * (float)i / p * M_PI));
    glVertex3f(R * cos((float)j / q * M_PI / 2.0) * cos(2.0 * (float)i / p * M_PI),
        -R * sin((float)j / q * M_PI / 2.0),
        -R * cos((float)j / q * M_PI / 2.0) * sin(2.0 * (float)i / p * M_PI));
}
glEnd();
```

➤ For helix:

- ❖ I looped through num of vertices then I draw the angle and 3 axis

```
case 2:
    // Helix properties.
    glPolygonMode(GL_FRONT_AND_BACK, GL_LINE);
    glColor3f((float)rand() / RAND_MAX, (float)rand() / RAND_MAX, (float)rand() / RAND_MAX);
    // calculate number of turns based on height and radius of helix
    //turns = pitch / (2 * M_PI * R);
    // calculate number of vertices based on number of turns
    int numVertices = (int)(turns * n);

    // draw the helix
    glBegin(GL_LINE_STRIP);
    for (int i = 0; i <= numVertices; i++) {
        float angle = i * 2 * M_PI / n;
        float x = R * cos(angle);
        float y = R * sin(angle);
        float z = i * pitch / numVertices;
        //glColor3f(c1, c2, 0);
        glColor3f((float)rand() / RAND_MAX, (float)rand() / RAND_MAX, (float)rand() / RAND_MAX);
        glVertex3f(x, y, z);
    }

    glEnd();

    break;
}
glFlush();
```

- ❖ To increase/ decrease radius of helix

```
case 'r':
    if (R > 1) {
        R -= 1;
        glutPostRedisplay();
    }
    break;
case 'R':
    R += 1;
    glutPostRedisplay();
    break;
```

- ❖ To increase/ decrease pitch of helix (we initialize pitch with 5)

```
case 'h':
    if (pitch > 1) {
        pitch -= 1;
        glutPostRedisplay();
    }
    break;
case 'H':
    pitch += 1;
    glutPostRedisplay();
    break;
```

- ❖ To increase/ decrease number of vertices of helix (we initialize numVertices with 10)

```
case 'n':
    if (n > 10) {
        n -= 1;
        glutPostRedisplay();
    }
    break;
case 'N':
    n += 1;
    glutPostRedisplay();
    break;
```

Runs:

- ❖ The start run:

```
Interaction:

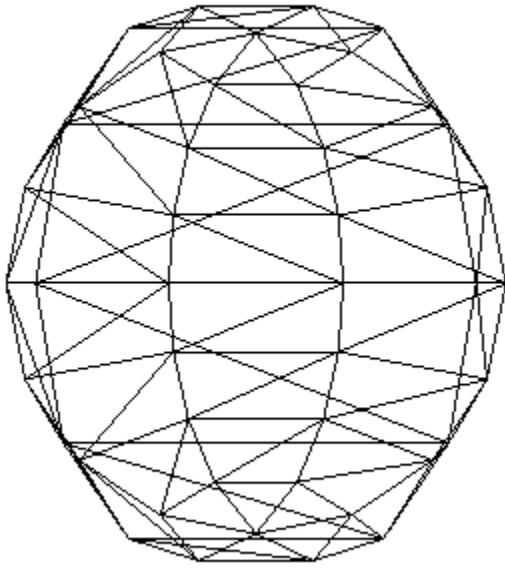
First: choose the shape do you want to draw

For hemisphere:
Press P/p to increase/decrease the number of longitudinal slices.
Press Q/q to increase/decrease the number of latitudinal slices.
Press x, X, y, Y, z, Z to turn the hemisphere.

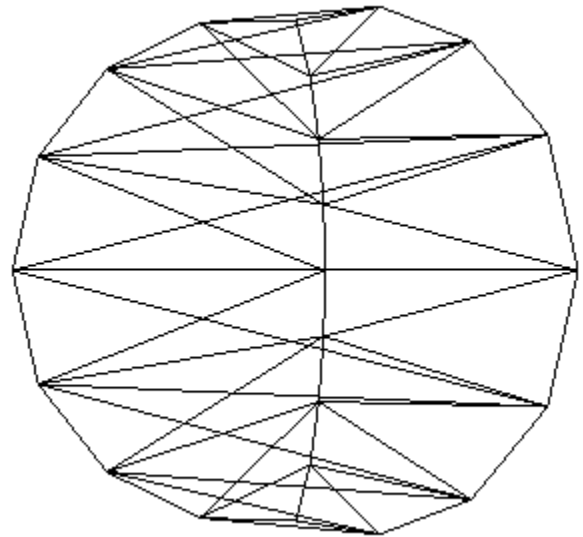
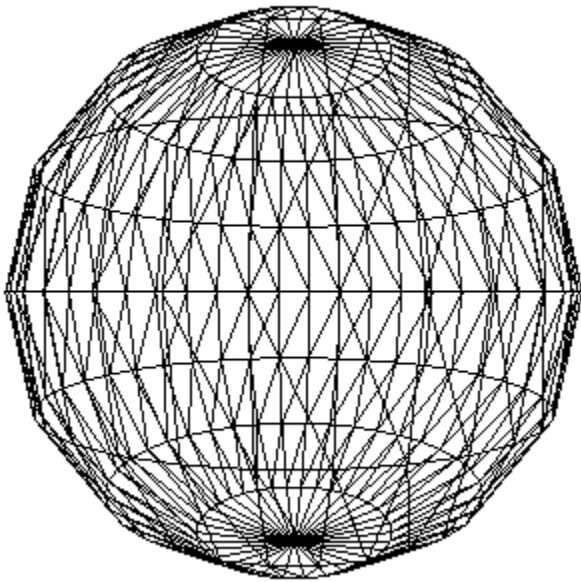
For helix:
Press N/n to increase/decrease number of vertices used to draw the helix
Press H/h to increase/decrease pitch of helix.
Press R/r to increase/decrease radius of the helix.

Which shape do you want to draw:
1) sphere
2) helix
>>
```

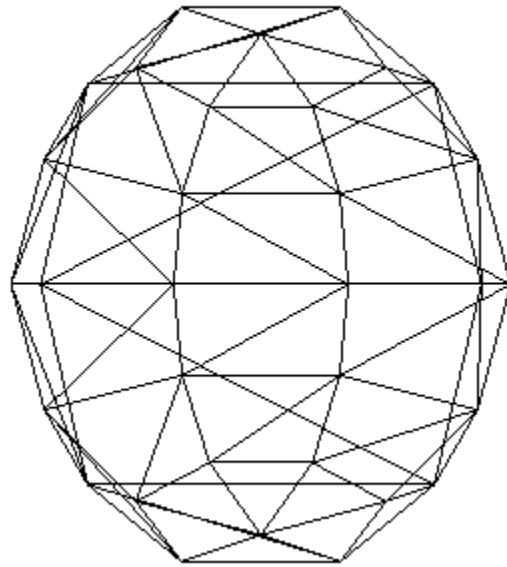
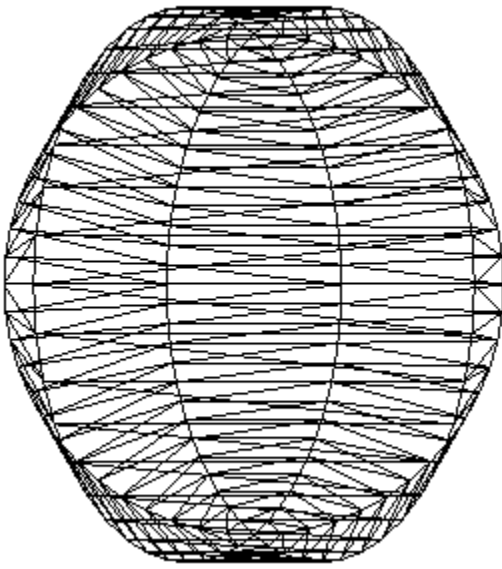
❖ If we press 1:



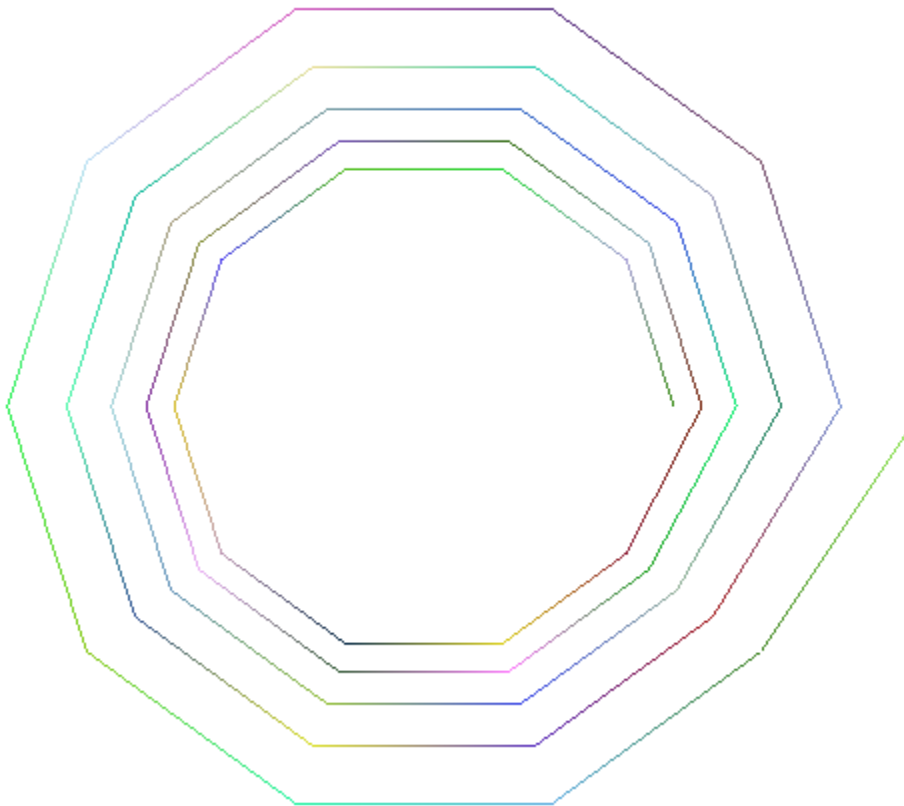
• If we press 'P/p':



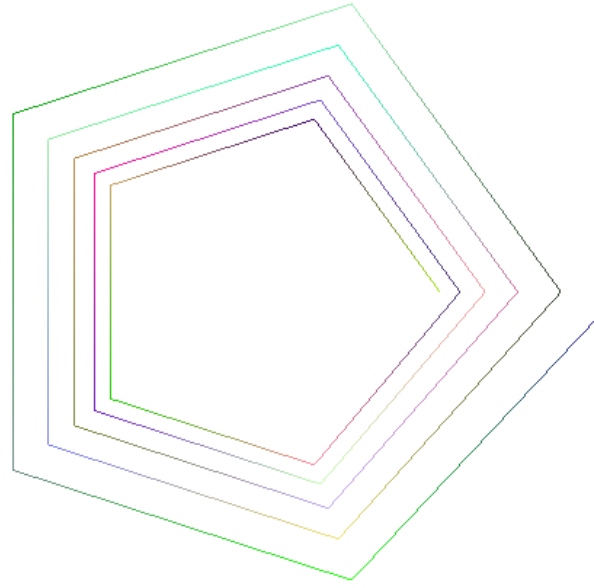
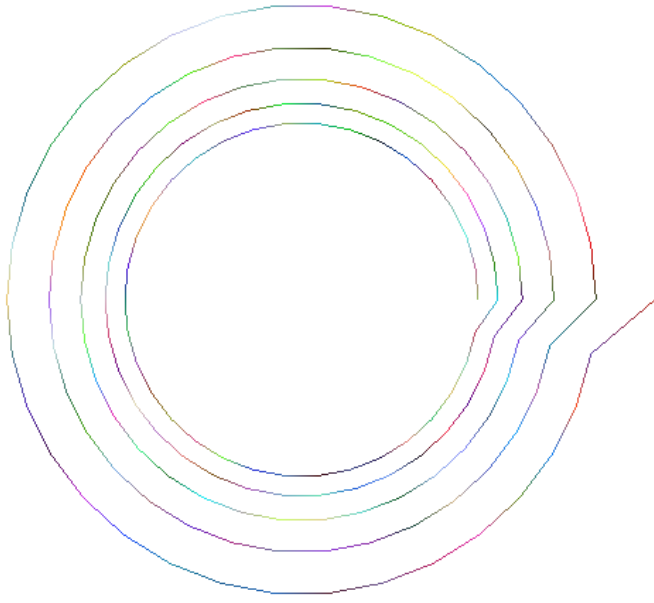
- If we press 'Q/q':



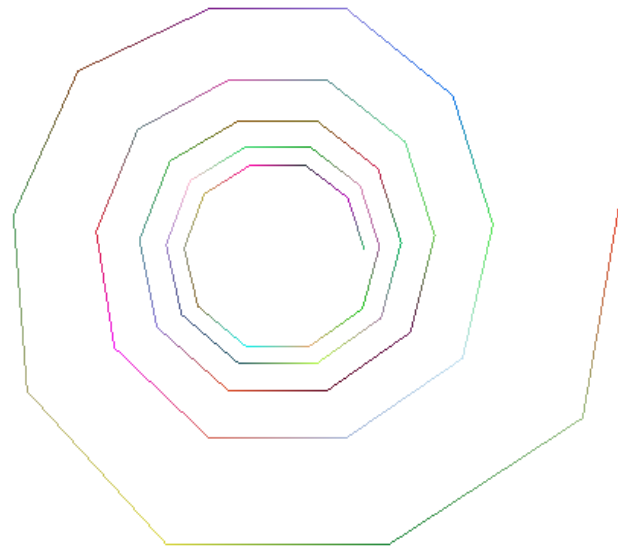
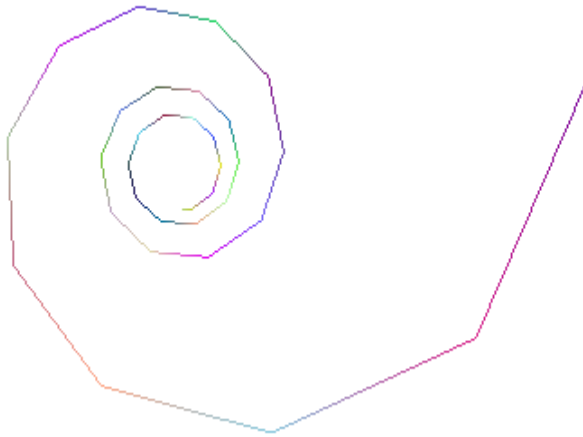
- ❖ If we press 2:



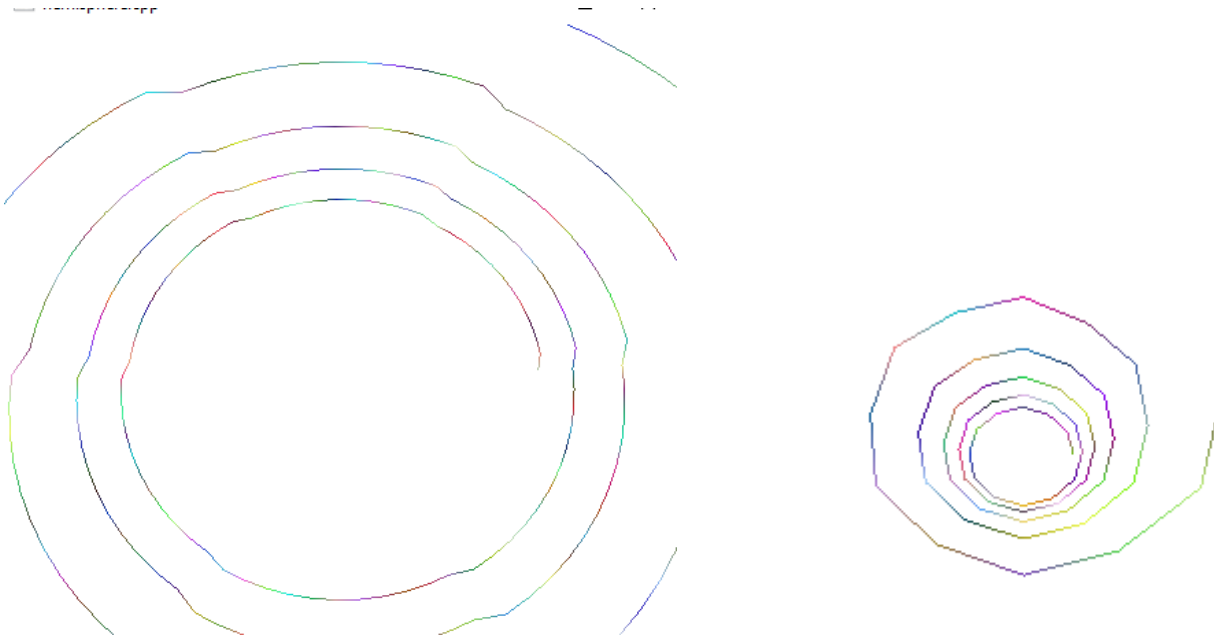
- If we press 'N/n':



- If we press 'H/h':



- If we press 'R/r':



- The view:

