

Module 2: Transformations and Scene Creation

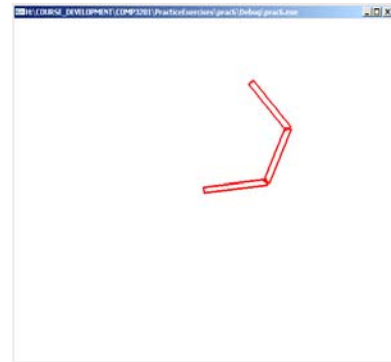
Lab Exercises for Week 7

(a) Orthographic and Perspective Projections

- Use the house constructed in Lab Exercises for Week 4.
- Experiment with projections, so that
 - F2 displays the house using a 2D orthographic projection
 - F3 displays the house using a 3D orthographic projection
 - F4 displays the house using a 3D perspective projection
- Build in functionality to rotate the model using function key F5.
- Observe the differences when rotating the house in each of the orthographic and perspective projections.
- Is your output on the screen as expected? Explain any “missing” portions of your house.

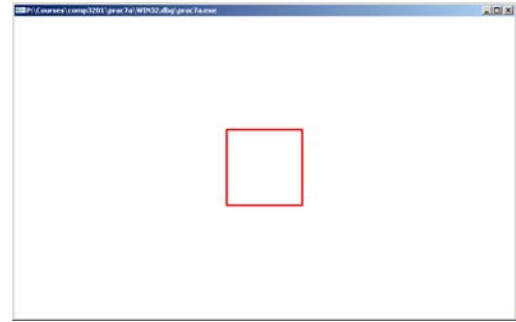
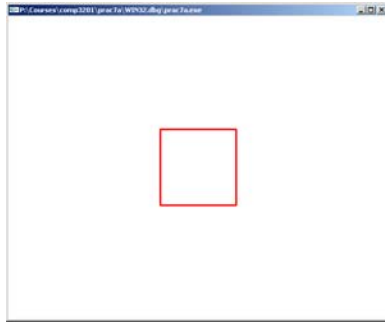
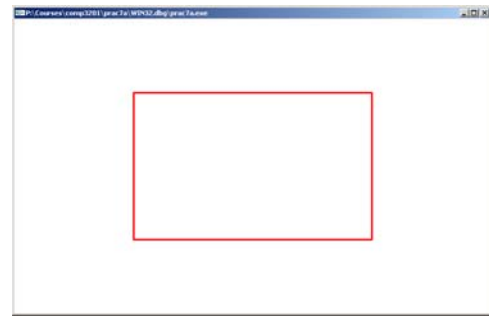
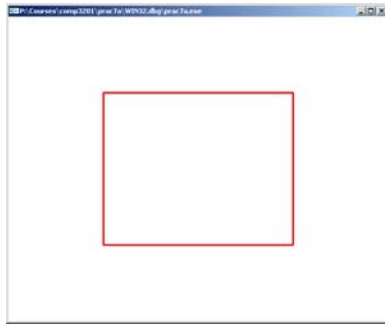
(b) A Robot Arm

- Create a 3-segment robot arm that rotates each segment independently.
- Use the keys ‘s’, ‘e’, and ‘w’ to control movement at the “shoulder”, “elbow” and “wrist”, respectively.



(c) Viewports and Aspect Ratios

- Write a program to display the glutWireCube on your screen.
- Explore what happens to the cube when you resize the window. The distortion occurs because the default Viewport is **glViewport(0, 0, width_of_window, height_of_window);**
- Modify your program so that the distortion does not occur. (Hint: use the callback function **glutReshapeFunc**).
- The two top figures show the output without using the reshape function, while the bottom two figures show the correct aspect ratio.



(d) Using gluLookAt

- Draw a simple model (a cube, or your previous house) and use **gluLookAt** to position the camera. Make sure that you are using a perspective projection transformation.

