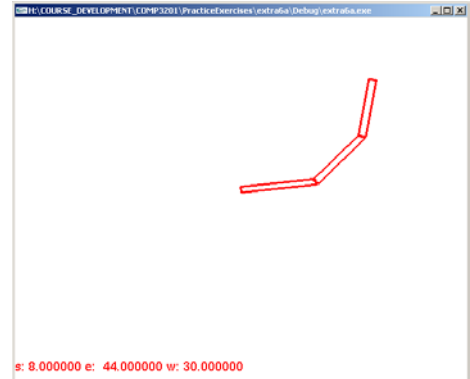


Module 2: Transformations and Scene Creation

Lab Exercises for Week 8

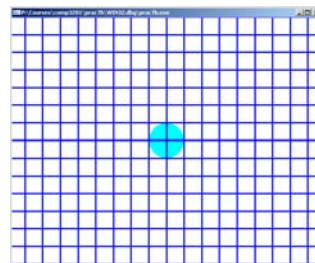
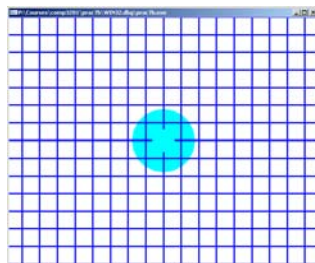
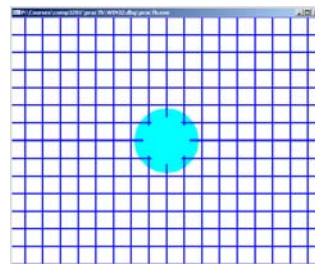
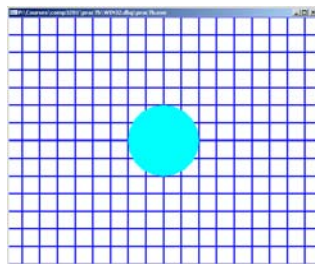
(a) Robot Arm plus Display Angle

- Modify your program to display the 's', 'e' and 'w' angles at the bottom of the window.



(b) Depth Buffer Investigation

- Display a grid in the XY plane and draw a solid sphere that is initially in front of the grid (make sure that you draw the grid first then draw the sphere).
- Include functionality so that when you press the space bar, the solid sphere moves backwards so that the sphere will pass through the grid. Note that even when the position of the sphere is located behind the grid, because the sphere is drawn last, it still appears that the sphere is in front of the grid.
- Now enable the use of the depth buffer. This time the sphere should seem to pass through the grid as it moves.



(c) Culling of Hidden Surfaces

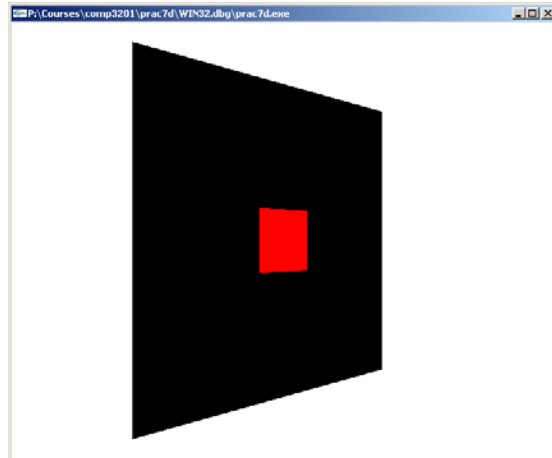
- Examine the culling of hidden surfaces by examining the time it takes to draw a few hundred thousand triangles.
- Draw half of the triangles in a forward facing direction and the other half backwards facing.
- Collect timing information with and without culling of the back faces by assigning a key to turn on and off the culling.



```
"P:\Courses\comp3201\prac7c\WIN32.dbg\prac7c.exe"
Escape key - exit the program
Space key - toggle back face culling
Time for front facing polygons display: 153
Time for back facing polygons display: 142
Time for executing the loop: 9
Culling On
Time for front facing polygons display: 147
Time for back facing polygons display: 134
Time for executing the loop: 9
Culling Off
Time for front facing polygons display: 147
Time for back facing polygons display: 142
Time for executing the loop: 9
```

(d) Investigate the Depth Buffer and Coplanar Objects

- Implement a coplanar surface using depth buffering (and watch the weird effects! You may need to add a key to rotate to have the effects show up.) Other examples of this situation are
 - cricket pitch against the grounds
 - cat's eyes on the road.
- Now temporarily disable the depth test for the drawing of the overlaying object.
- You could draw a coloured rectangle on a flat background, and rotate it 5 degrees when the space bar is pressed.



(e) Animation - Interlocking Gears

- Create two interlocking gears that rotate when the system is idle.
- Double buffer the animation to avoid flickering.

