

CPSC 314, Written Homework 2

Out: Mon 28 Jan 2013
Due (Updated): Wed 13 Feb 2013 5pm
Value: 4% of final grade
Total Points: 100

1. (10 pts) Give the camera/viewing transformation matrix for an eye position (2,3,1), a lookat point (4, 5, -5) and an up vector (0,-1,0).
2. (10 pts) Give the perspective projection matrix for a view volume with a near plane of 3, far plane of 15, a left plane of 2, a right plane of -2, a top plane of 3, and a bottom plane of -3.
3. (10 pts) Give the NDC-to-display transformation matrix for a viewport 900 pixels wide and 800 pixels high, with the origin in the upper left of the display.
4. (10 pts) In world coordinates, a point is (4, 4, -6). Give its coordinates in the camera coordinate system, after the viewing transformation from problem 1 above has been applied to it.
5. (10 pts) Then give its coordinates in the clipping coordinate system, after the perspective warp for the frustum specified in problem 2 has been applied to the tetrahedron points in camera coordinates (that is, the answer from problem 4).
6. (10 pts) Then give its coordinates in the normalized device coordinate system, after the perspective divide has been applied to the answer from problem 5.
7. (10 pts) Finally, give its coordinates in the display coordinate system, after the viewport transformation of problem 3 has been applied to the answer from problem 6.
8. (30 pts) Derive the values $C = -(f+n) / (f-n)$ and $D = -2fn/(f-n)$ in the perspective to NDCS matrix, where $z' = Cz+D$.