CSL 781 MAJOR EXAM

SEMESTER II 2009-2010

330pm-530pm

Please keep your answers precise and to the point -- you will lose points for irrelevant text.

1. [10] What is a Mip-map? How does one generate it?

2. [10] What is aliasing? How does it manifest itself? Explain how we reduce it.

3. [10] How many independent parameters (degrees of freedom) does a 3D projective transformation have? Explain your answer.

4. [10] How would you transform a vector from a given basis to a new basis whose origin is at O and whose three orthonormal basis vectors are V1, V2, and V3, respectively -- all specified in the original basis.

5. [10] What is a shadow ray?

6. [10] What is clip-space? What is its significance?

7. [20] Given a triangle formed by vertices (V1, V2, V3), and a ray (O, d) -- all five are float3 -- d is a unit vector, provide an efficient (in terms of actual operation count) algorithm to determine if the ray intersects the triangle -- and if it does, determine the point of intersection.

8. [20] Describe how you might generate soft shadows in the OpenGL graphics pipeline (just the algorithm -- openGL functions not needed).

9. [20] Using OpenGL graphics pipeline, you want to include a triangle in your model that is a perfect mirror. How might you do it (no openGL functions need to be quoted)?