CSL 781/MAL 754 MAJOR EXAM

SEMESTER II 2007-2008

All answers must be entirely yours!

1. [10 points] How should the vertex normals be transformed, given an affine transformation M for the surface vertices. Explain.

2. [10 points] Explain the terms rigid transformation, linear transformation, and affine transformation

3. [5 points] Explain the terms vertex shader and fragment shader.

4. [5 points] Explain the difference between Phong shading and Gouraud shading.

5. [5 points] What is a Steneil Buffer?

6. [10 points] What is Shadow Map? How is it used?

7. [10 points] Write a function for recursive ray-tracing. (Precise syntax not required.)

8a. [5 points] What is a spline?

8b. [10 points] Given n points in space, I want to fit a eubic B-spline passing through them. Give an algorithm.

9a. [10 points] What are texture borders? Why are they used?

9b. [20 points] Suppose we dccide to dispense with separate borders, and instead include it in the main texture. We must allow MIP mapping: ie, start with a given 2^i X 2^j 2D texture map, and halve the size in each dimension at eaeh level. Will this seheme work? Explain how the higher levels will be generated from the given texture. If in your scheme, the texture coordinates (specified for vertices *vis-a-vis* the given texture) will need to change for different MIP-MAP levels. If so, how?