CS 543 - Fall '02 - Final Exam

Name:

Read questions carefully before answering. Do not hesitate to ask for clarification. Show all work. You only need to answer 6 of the first 7 questions (please mark the one you want to skip). Partial credits are given, so do not leave anything blank! Use the back of the pages or extra paper as needed. Please write clearly. Good luck!

"Examinations are formidable even to the best-prepared; for the greatest fool may ask more than the wisest man can answer". Charles Colton

1a. (8 pts) The Marching Cubes algorithm is a popular method for generating an isosurface from a volume data set. Briefly describe how it works.

1b. (8 pts) Sketch all of the **unique** configurations for which four corners of the cube are less than the isovalue and the rest are greater than it.

2a. (8 pts) What is the transformation that converts a point in window coordinates to viewport coordinates?

2b. (8 pts) How would you specify this in matrix-vector form?

CS 543 - Fall '02 - Final Exam

3. (16 pts) Describe three factors that one might consider when choosing a solid modeling technique. For each factor, describe how you would assess the octree representation using that factor.

a.

b.

c.

4. (16 pts) Briefly describe at least three distinct rules one should follow to create an effective visualization.

5. (16 pts) Describe the main concepts of fractal modeling. Use, as an example, some natural object or phenomenon that exhibits fractal characteristics in your description.

CS 543 - Fall '02 - Final Exam

6. (16 pts) Given that you are ray tracing a unit sphere, prove that for some affine transformation A (you can choose A), applying the inverse tranformation to the ray yields the same intersection points as transforming the unit sphere by A.

7. (16 pts) Describe the characteristics of each of the following curves in terms of issues such as control points and continuity;

1. Hermite:

2. Bezier:

3. B-Spline:

4. Catmull-Rom:

8. (4 pts) [A REPEAT QUESTION!] Would you have preferred "hard" deadlines for the projects instead of the self-paced format that was followed this semester? Please provide some details of your opinion on this matter.