

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), plus the last question. 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

1. (16 pts) The Marching Cubes algorithm is a popular method for generating an isosurface from a volume data set. Each group of 8 adjacent voxels is analyzed to determine if the isosurface penetrates the cube of space bound by the voxels, and one or more triangular patches are computed to create the surface. Sketch examples of configurations for which one, two, three, and four triangular patches would be needed to define the boundary. Indicate which corners are inside and which are outside the isosurface. [Hint: you can assume the voxels have integer value and the isovalue has a fractional component.]

2. (16 pts) In our discussion of projections we saw that for parallel projection the plane of projection could either be perpendicular to the view direction or non-perpendicular (oblique). For perspective projection the assumption has always been the plane of projection is perpendicular to the N-axis of the viewing coordinate system. Describe what would result if the plane of projection was **not** perpendicular to the N-axis for perspective projection.

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3. (16 pts) Describe a method for modeling soft objects. Indicate how you could modify parameters of the model to distort the shape over time.

4. (16 pts) List at least 6 graphical attributes that could be used in data visualization and indicate which one would be most accurately measured by the viewer.

5. (16 pts) Sketch several stages in the fractalization of a line into a fractal curve. Feel free to use any of the fractal forms we discussed or invent your own.

