CMSI 671

COMPUTER GRAPHICS

Spring 2005

Final Review Sheet

The following bullets summarize the material that we have covered thus far, and the "skill set" that you will need in order to do well on the May 3 final. The final is open-book, so the focus will be on applications and deep conceptual understanding. Material from before the midterm is also fair game — so take a look at the review sheet for that also — though there will certainly be an emphasis on what we discussed after that.

- Transforms, transforms, transforms! Be comfortable with building them, manipulating them, deriving them, and composing them. Agility with matrix manipulation is also a given.
- Be familiar with 3D modeling approaches for both objects and the environment. You have done some degree of modeling on your respective papers; you are sure to know that specific type of modeling well. Make sure that you remain aware of other modeling approaches that you might not have worked with directly yourself.
- 3D environment modeling includes the modeling of light, so be familiar with the terms and concepts in OpenGL's approach. Also be comfortable with the distinction between current lighting/shading implementations and "real" lighting in the real world.
- Be comfortable with the overall real-time rendering pipeline: model/view matrix, camera positioning and orientation, clipping, projection (orthogonal and frustum), hidden surface removal, shading and coloring, and final mapping to the viewport.
- In detail, know the assorted derivations involved for the various projection matrices and the camera. Since the test is open books and notes, "knowing" simply means being able to comprehend the notes that you already have. A question that asks you to re-derive or modify any of these matrices or algorithms is fair game for the final.
- Be familiar with the assorted clipping algorithms and how they work. Have some knowledge of their relative advantages and disadvantages.
- Ditto for hidden surface removal algorithms. In particular, know who won! And why. And of course, know how it works.
- Be comfortable with polygon scan conversion and shading. Shading of course combines different mechanisms for determining color, and includes algorithms for interpolating color. Understand the relationship between hidden surface removal, polygon scan conversion, and shading.
- Finally, be ready to address alternative rendering techniques: "cheap" shadowing, the rendering equation, radiosity, and ray tracing. For the latter three topics, skim through and understand at least the overall flow of the papers that I distributed; I won't expect in-depth understanding of these algorithms, but I think it's fair to ask something that can be easily found in one (or more) of the papers.

The midterm covered Angel Chapters 1–4, with some of Chapter 5 and background material from Appendices B and C. For the final, we add all of Angel Chapters 5, 6, and 9. We also discussed Chapter 7.6, some of Chapter 8 (8.1–8.11), and skimmed over the core concepts of Chapter 10 as part of our 3D object modeling discussion. Angel covers ray tracing, the rendering equation, and radiosity in part of Chapter 13 (13.1–13.5) — with the original gory details provided in the seminal papers by Whitted, Kajiya, and Goral et. al.