

CS 543: Computer Graphics
Final review

Emmanuel Agu

Exam Overview

- Wednesday, December 12, 2007 in-class
- Midterm covered up to end of lecture 5 part II (illumination. & shading)
- Final will cover everything from lecture 6 till today!!
- Can bring:
 - One page cheat-sheet
 - Calculator
- Will test:
 - Theoretical concepts
 - Mathematics
 - Algorithms
 - Programming
 - OpenGL knowledge (program structure and some commands)

3D Viewing

- `gluLookat(Eye, COI, Up)` to set camera
 - How to build 3 new vectors for axes
 - How to build world-to-eye transformation
 - Pitch: nose up-down
 - Roll: roll body of plane
 - Yaw: move nose side to side
- Projection:
 - View volume, near plane, far plane
 - `gluPerspective(fovy, aspect, near, far)` **or**
 - `glFrustum(left, right, bottom, top, near, far)`
 - `glOrtho(left, right, bottom, top, near, far)`
 - How to build Perspective and Ortho matrices

3D clipping and Viewport transformation

- Liang-barsky algorithm
- Viewport transformation in 3D
- Illumination models
 - (ambient, diffuse, specular)
 - Phong model
 - OpenGL lighting and shading
 - Phong, Gouraud shading
- Hidden Surface Removal
 - Z-buffer
 - Backface culling

3D Viewing

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3D clipping and Viewport transformation

- Liang-barsky algorithm
- Viewport transformation in 3D
- Shading: Flat, Phong, Gouraud shading
- Hidden Surface Removal
 - Z-buffer
 - Backface culling
 - Painter's algorithm

Outline

- Line drawing
 - Integer DDA (simplest algorithm)
 - Bresenham's line drawing (midpoint version in Hill)
 - Why is one Bresenham better?
- Pixmap operations
 - Read, combine pixmaps (addition, subtraction, etc), scaling pixmaps, rotating pixmaps, alpha channel: image blending
- Polygon filling algorithms
 - Recursive Flood fill
 - Improving flood fill using coherence
 - Filling polygon-defined areas
- Antialiasing: pre-filtering, supersampling, post filtering (weighted supersampling)

Outline

- Ray tracing
 - Define objects, camera, light sources in SDL
 - Set OpenGL up for 2D drawing using blockSize
 - Camera geometry set up
 - Build RC-th ray
- Object intersections
 - Sphere
 - Plane
 - Cube
 - Mesh

Outline

- Dealing with transforms, normals
- Organizing ray tracer
 - `getFirstHit()`
 - `shade()`
 - Phong shading
- Raytracing
 - Shadows
 - Reflection and transparency