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