Midterm Review

Announcement

Will cover

Will test:

In addition

General Advise

- Midterm exam: 11/17, 1:25pm ~ 3:00pm
- Videos and Demos on 11/15.
- Close-book and close-notes
- One-page cheating sheet

- All the material before advanced topics

- Theoretical concepts
  - Mathematics
  - Algorithms
  - Programming
  - OpenGL knowledge (program structure and some commands)
  - Creation

- Test that:
  - you did the course assignments
  - you understand what you did in your assignments

- Read your projects and refresh memory of what you did
- Read the slides (the slides only cover the 50% content, do not forget other 50% content from your notes).
- Focus on Mathematical results, concepts, algorithms
- Should be able to predict subtle changes to algorithm..
  - What if?..
- Every lecture has references. Look at refs to focus reading
- Do all readings I asked you to do on your own
Theory

- Vector Operations:
  - Addition, subtraction, scaling
  - Magnitude
  - Normalization
  - Dot product
  - Cross product
  - Finding angle between two vectors
  - Standard unit vector
  - Normal of a plane

- Transforms
  - Homogeneous coordinates Vs. Ordinary coordinates
  - 2D/3D affine transforms: rotation, scaling, translation, shearing
  - Should be able to take problem description and build transforms and apply to vertices
  - 2D: rotation (scaling, etc) about arbitrary center:
  - Composing transforms
  - OpenGL transform commands (glRotate, glTranslate, etc)
  - 3D rotation:
    - x-roll, y-roll, z-roll, about arbitrary vector
    - Matrix multiplication!!

Theory (cont.)

- 3D Viewing
  - Modelview (M and V part)
  - Projection
  - Clipping
  - Viewport
  - Should know high-level what each stage does
  - OpenGL matrices: what are they? How to select, initialize, compose
  - Hierarchical modeling using OpenGL

- Hidden surface removal
- Scan-line conversion
- Local illumination
- Global illumination (ray tracing)
- Texture

Programming

- What is OpenGL?
- What is GLUT?
- OpenGL/GLUT program structure (create window, init, callback registration, etc)
- OpenGL Drawing, glBegin(), glEnd(), glVertex() 
- OpenGL Drawing primitives: GL_POINTS, GL_LINES, etc (should be
- Interaction: keyboard, mouse
  (GLUT_LEFT_BUTTON, etc)

Programming (cont.)

- Assignment 0 & 1 & 2
  - Screen coordinate system/Viewport
  - World coordinate system/World window
  - Window to Viewport mapping:
    - Perspective transformation
      - View volume, parallel view volume, normalized view volume
    - OpenGL way
    - Matrix way: calculate mapping
    - Pseudocode and real code