

Midterm Review

CSC5870 Computer Graphics I

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Announcement

- Midterm exam: 11/8, 6:00pm ~ 7:20pm
- Close-book and close-notes
- One-page cheating sheet

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Will cover

- All the material till today

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Will test:

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

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In addition

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

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General Advise

- 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 ifs?..
- Every lecture has references. Look at refs to focus reading
- Do all readings I asked you to do on your own

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Theory

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

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Theory (cont.)

- **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!!

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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

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Theory (cont.)

- **Hidden surface removal**
- **Scan-line conversion**

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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)

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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

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