CS174 Midterm Review

Exam this Wednesday
Closed Book
No Electronic Aids

Exam Contents

- Multiple choice questions
  - No partial credit, small penalty for wrong answers
- 1 "Draw what OpenGl would draw"
  - 20% of the grade

What to study

- Up to and including Slides 07
  - Affine Transformations
  - Coordinate Systems and Transformations
  - Order of operations with Matrices
  - Projection Transformations
  - Understanding Lines and Points
  - OpenGL

Affine Transformations

- Translate, Scale, Shear, Rotate
- How are they represented?
- What effect do they have on objects?
- What effect do they have on angles?
- What is the form of the inverse matrices for these transformations?

Coordinate Systems

- Given a coordinate system and a point, can you give the coordinates of that point in the coordinate system?
- If a matrix represents a coordinate system, what does it mean to multiply a point by the matrix?
- Given basis vectors $\mathbf{b}_1, \mathbf{b}_2, \mathbf{b}_3$, and origin O, how do we convert from the canonical coordinate system to the $[\mathbf{b}_1\ \mathbf{b}_2\ \mathbf{b}_3\ O]$ coordinate system?
- Given a picture of two coordinate systems, can you describe the operations that transform one to the other?

Projection Transformations

- Given a point in x, y, z space, how do we calculate where it appears on the screen?
- How is the perspective projection different from affine transformations?
- What do perspective projections preserve?
  - Parallel lines?
  - Ratios of points along a line?

Understanding Lines and Points

- Explicit, implicit, parametric: What are they? What are they good for?
- How do we use an affine combination to find point *C* which is 20% of the way from *A* to *B*?
- How do we reflect a point across a line in 2D?

OpenGL

- Given a set of OpenGL commands and graph paper, draw what appears on screen

Try to <u>understand</u> what's in the lecture slides, rather than memorize them

- Focus on understanding what transformations mean rather than memorizing actual formulas
  - Don't try to memorize any "proofs" in the slides
  - For example: Don't memorize rotation matrix for rotation around X vs. around Z
    - Instead, understand what a rotation matrix looks like
    - what happens to it when you invert it?
    - How it differs from other transformation matrices?
- If you understand the material in lecture slide sets 02 to 07, you should do well on the exam!