

Midterm Review Session

CS 148

Stanford University

October 25th, 2012

General Information

- In class on Tuesday, Oct. 30th
- Written, closed book, and closed notes
- No calculators
- Covers all content presented in the lectures, assigned readings, and assignments up till the date of the midterm
- Slides will summarize topics that you should understand for the exam

OpenGL Drawing Machine

- Raster displays: How do is a picture drawn to the screen?
- Framebuffers, windows, viewport: How are they related to each other? How do they interact with each other?
- OpenGL primitives: geometric shapes, bitmaps, and images
 - How do you draw a primitive using OpenGL calls? How do you specify the color and transparency of the primitive?
 - What can you or can you not draw with each primitive?
- Framebuffers: single buffering, double buffering, triple buffering, ...
- OpenGL pipeline

CS 148

Midterm Review Session

Geometry

- Triangles:
 - Why are they the fundamental primitive for computer graphics?
 - Useful properties of triangles: Do other shapes (i.e. quadrilaterals) also have the some or all of the properties?
- Rasterization
 - When should a fragment be turned on/off?
 - Triangle orientation
 - Triangle inside test
- Barycentric Coordinates
 - What is the intuition behind barycentric coordinates?
 - Computing barycentric coordinates: Different methods may be easier to apply to a specific problem
 - Use in interpolation of colors, texture coordinates, and normals

CS 148

Midterm Review Session

Transforms

- Different types of linear transformations including (nonuniform) scaling, rotation, and translation
- Matrix representation of linear transformations
- Linear transformations preserve straight lines while nonlinear transforms can map lines to curves
- Coordinate frames
- Composing transformations: commutativity and associativity of matrix operations
- OpenGL Transformation Stack: relevant OpenGL commands and underlying structure of the stack

CS 148

Midterm Review Session

Input Technology and Interaction Techniques

- Tracking transitions in the state versus tracking the state
 - GLUT keyboard and mouse interface
 - Flash keyboard interface
- Polling vs. Events: definitions, advantages and disadvantages
- Picking in OpenGL
- Finite state machine for push buttons and menu buttons

CS 148

Midterm Review Session

Interpolation and Morphing

- Uses of interpolation: basic texturing and shading
 - Review different types of interpolation used in the morphing assignment
- Nearest neighbor interpolation
- Linear interpolation, bilinear interpolation
- Barycentric interpolation
- Which technique is most appropriate for interpolating over an image? Which technique is best suited for interpolating over a triangle mesh?

CS 148

Midterm Review Session

Splines and Curves

- Cubic Hermite interpolation: matrix representation of solution
- Catmull-Rom interpolation: How are tangents defined at points?
- Bézier Curves
 - Specification using points
 - De Casteljau Algorithm: recursive method for evaluating Bézier curves
 - How does the algorithm work?
 - Properties of the algorithm
 - Subdivision: divide and conquer
 - Relationship between the original, left, and right Bézier curves
 - How do you determine how many times you need to subdivide?

CS 148

Midterm Review Session

Typography

- Bitmaps vs. Calligraphic fonts
- Define key terms: serif, leading, kerning, etc.

CS 148

Midterm Review Session

Light and Color

- Electromagnetic Spectrum: Spectral power distribution of light sources
- Adding light energy
- Reflection and transmission of light
- Human eyes: Rods and cones and their associated response curves
- Trichromatic theory: RGB color cube
- Color Spaces: RGB, YUV, HSV, CMYK
 - How do you transform between different color spaces?
 - What are common applications for each color space?
- Differences between additive and subtractive color mixing

CS 148

Midterm Review Session