Announcements

Midterm – on Thursday!
Raytracer due on April 10\textsuperscript{th}

Please don’t wait until the last minute…waiting until after the midterm is ok however
Agenda

Midterm Review
Roller Coaster Movie
Midterm Grades
Assignment 2 Grades
How to Study for Midterm

Slides + notes
  Our distillation of what we think is most important in the book

Textbook
  Followed relatively closely this semester

Make up potential questions
What will questions be like?

Closed book, closed notes
Anything from class is fair game
Most similar to written assignments
Except shorter because we have only the single class period—bias towards “knowledge” questions instead of derivations
Probably will have less emphasis on material that was well covered in programming assignments
Will likely have one “thought” question—no immediate answer from class notes but with a bit of thought you should be able to answer the question
Review: Graphics Pipeline

Basic pipeline
  primitives -> transforms -> clipping -> projection -> rasterizer -> pixels

OpenGL – not really appropriate for midterm questions...
Review: Event-Driven Programming

Double buffering – why?
Hidden surface removal—what techniques are used and why?
  Painter’s algorithm
  Z-buffer
  Ray-casting
Review: Math for Computer Graphics

Vectors

Coordinate Systems

Dot products, cross products
  Used extensively in assignments

Normals

Implicit, parametric equations
  \[ f(x,y,z) = 0 \] vs. \[ x=f(s,t), \ y=g(s,t), \ z=h(s,t) \]

Barycentric Coordinates
Review: Transformations

Two-dimensional
  Scale, shear, rotate

Three-dimensional
  Rotate is more complicated (Euler angles, axis angle, quaternions)

Translation
  Homogenous transformations (4\textsuperscript{th} row/column)

Transforming Normals
  Why isn’t this just like points on the object?
Review: 3D Viewing

Perspective and orthographic views

Canonical view

Orthographic->canonical

Perspective->orthographic
Review: Nvidia Guest Lecturer

No slides…

Only high level questions
Review: Splines

Kinds of splines:
   Hermite Splines
   Catmull-Rom Splines
       Used for roller coaster assignment
   Bezier Splines
   Cubic Splines
   B-splines
   NURBS

C0, C1, C2 continuity

Properties: interpolation (or not) of knot points
Review: Textures and Modeling

Basics of Textures
  Mostly openGL – not midterm material

Modeling
  Polygon meshes
  Parametric surfaces
  Implicit surfaces
  CSG

Properties of various representations, advantages/disadvantages
Review: Shading

A bit about light, our eyes and displays

Illumination

Diffuse
Ambient
Specular (Phong Illumination)
Transmission
Shadows
Review: Ray Casting/Ray Tracing

Basic concepts tested via Assignment 3
  Ray/object intersection
  Recursion
Bell and whistles:
  Anti-aliasing (adaptive)
  Motion Blur
  Soft Shadows
  Soft Specular Highlights
  Depth of Field
Review: Spatial Data Structures

Good candidate for midterm, not tested otherwise

Object-centric
  Hierarchical Bounding Volumes

Space-centric
  Grids
  Octrees
  BSP trees
Review: Texture Mapping

Good candidate for midterm, not tested otherwise

Bump Mapping
Displacement Mapping

Environment Mapping
Procedural Textures
Review: Radiosity

Good candidate for midterm, not tested otherwise

Basic concept:
- patches – how much light transfer?
- Set of simultaneous linear equations to solve

Enhancements (much like ray tracing)
- Adaptive subdivision of patches

Two-pass rendering (radiosity + raytracing)
So what would make good midterm questions?

- Transformations
- Viewing
- Splines
- Polygonal meshes
- Shading
- Ray Tracing
- Spatial Data Structures
- Texture Mapping
- Radiosity
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