

Announcements

Midterm – on Thursday!

Raytracer due on April 10th

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

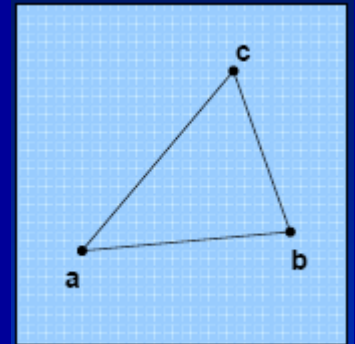
Used extensively in assignments

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 (4th row/column)

Transforming Normals

Why isn't this just like points on the object?

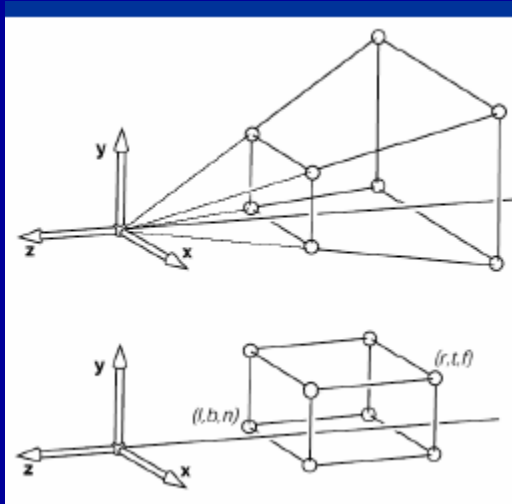
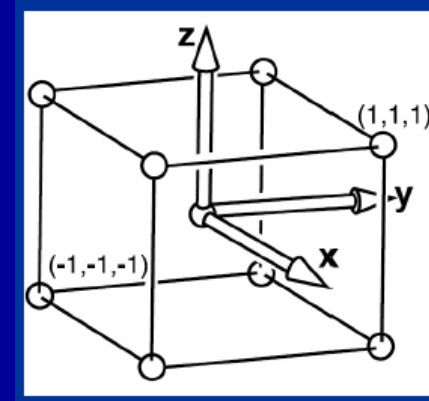
Review: 3D Viewing

Perspective and orthographic views

Canonical view

Orthographic \rightarrow canonical

Perspective \rightarrow 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

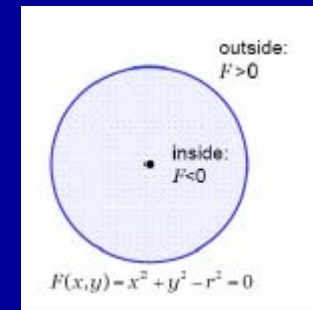
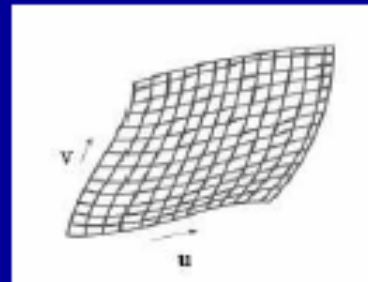
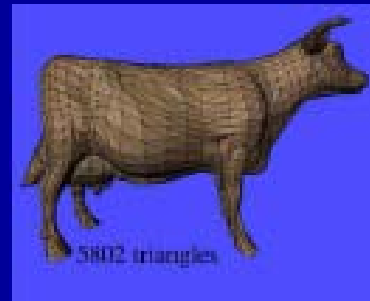
Modeling

Polygon meshes

Parametric surfaces

Implicit surfaces

CSG



Properties of various representations,
advantages/disadvantages

Review: Shading

A bit about light, our eyes and displays

Illumination

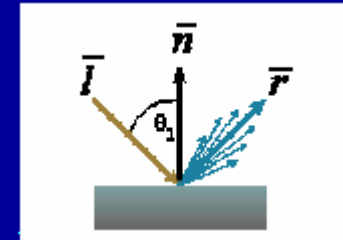
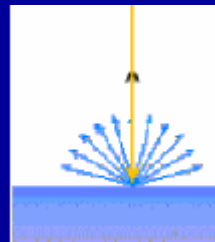
Diffuse

Ambient

Specular (Phong Illumination)

Transmission

Shadows



Review: Ray Casting/Ray Tracing

Basic concepts tested via Assignment 3

Ray/object intersection

Recursion

Bell and whistles:

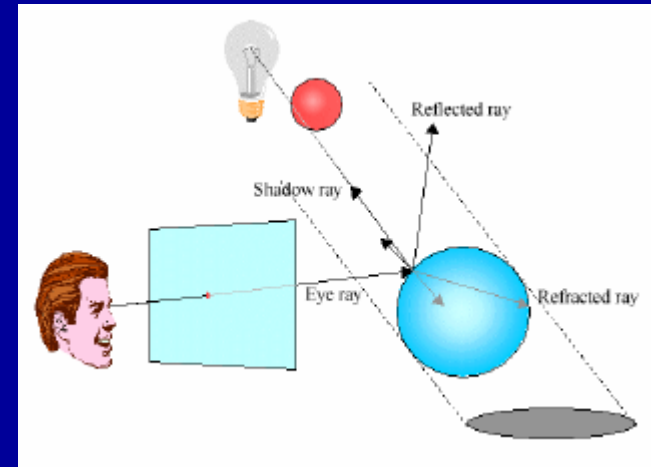
Anti-aliasing (adaptive)

Motion Blur

Soft Shadows

Soft Specular Highlights

Depth of Field

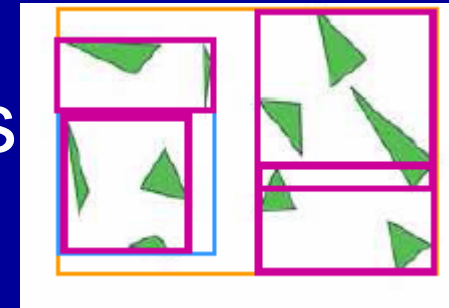


Review: Spatial Data Structures

Good candidate for midterm, not tested otherwise

Object-centric

Hierarchical Bounding Volumes

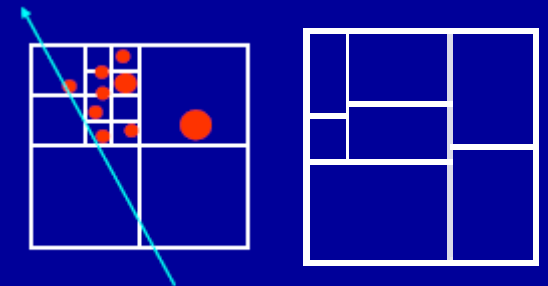
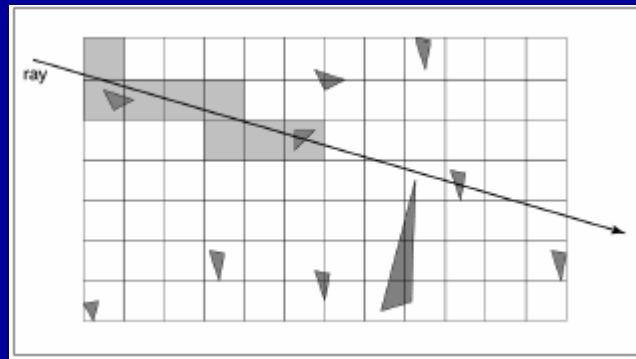


Space-centric

Grids

Octrees

BSP trees



Review: Texture Mapping

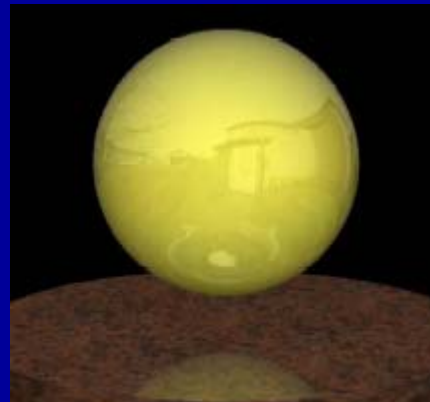
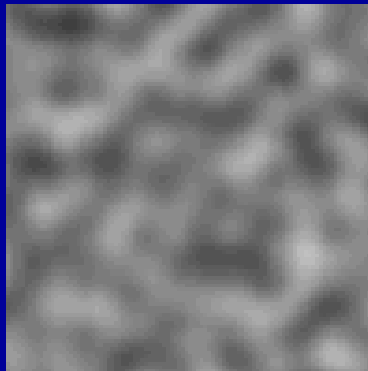
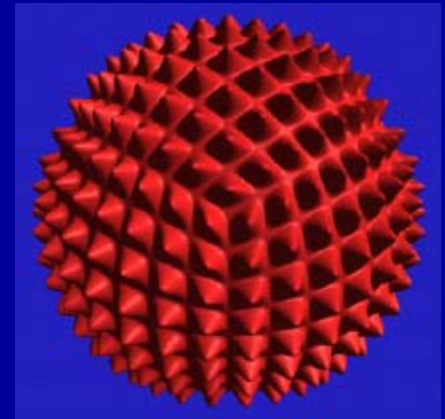
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Bump Mapping

Displacement Mapping

Environment Mapping

Procedural Textures



Review: Radiosity

Good candidate for midterm, not tested otherwise

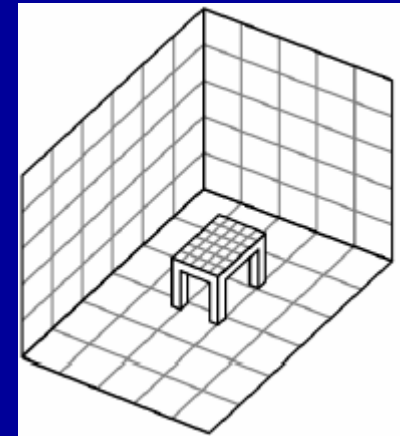
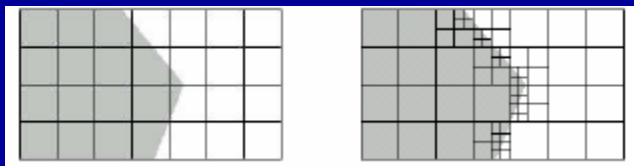
Basic concept:

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)

Questions?

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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