Final Exam Review, Spring 2015
CSE 5542
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A. Pre-midterm
   a. Hardware Pipeline - All Stages - names and what happens in each stage
   b. Parametric Forms -
      i. line, ray
      ii. planes, triangles, spheres, cylinders - equations and normals
   c. Other shapes - cubes - faces, and normals
   d. Transformations
      i. Modeling - Matrix forms
         1. Rotation, Translation, Scaling, Shear
      ii. Camera/Eye Transformation
         1. LookAt
         2. u-n-v
      iii. Viewing Transformations - Matrix Forms
         1. Perspective, Ortho
   e. Phong Illumination model -
      i. Components - ambient, diffuse, specular
      ii. Material and Light Components of Ambient/Diffuse/Specular
      iii. Distance-based attenuation
      iv. Computation of
         1. L vector, R vector, V Vector, H vector
      v. Approximations of Phong Model - H Vector

B. Creating and Lighting Spheres
   a. Lat-long method
   b. Subdivision method
   c. GLSL code

C. Clipping -
   1. Cohen Sutherland algorithm
      a. The meaning of outcodes
      b. The working of the algorithm for a given polygon - all steps
      c. 2D vs 3D versions
   2. Liang-Barsky Line Clipping - birds eye view
   3. Polygon Clipping and Pipeline-polygon clipping
   4. Clipping vs. visibility

D. Hidden Surface Algorithm
   a. Painters algorithm
   b. Problem with depth sorting - visibility cycles
   c. Back-face Culling
   d. Z-buffer algorithm
   e. Scanline z-buffer algorithm
   f. Incremental line drawing algorithms
g. Combining shading and interpolation
h. Scan-line fill algorithm

E. Hierarchical Models
   a. Graph/Tree representations, DAGs
   b. Articulated models
   c. Model view matrices
   d. Stack models
   e. Breadth-first sibling tree
   f. Modeling and Rendering with tree
      i. Robot. Car, Humanoid Example
      ii. Variations

F. Texture Mapping Basics
   a. GLSL, OpenGL code
   b. 2 step process
      i. intermediate mapping - spherical, cylindrical, cuboidal
      ii. Coordinate spaces involved
   c. Aliasing with Textures
   d. Interpolation with texture mapping
   e. Texture mapping parameters - magnification/minification, wrapping mode, filter mode, mip-maps, env_modes: replace, modulate, etc. with color
   f. Environment Map
   g. Bump Mapping

G. Compositing
   a. Operators - over, max, min, etc.
   b. Visibility Issues with transparency, A-buffer
   c. Simulating Fog with compositing

H. Advanced Texturing
   a. Regular textures - Chess board, Checker board, Brickwall
   b. Particle Systems -
      i. Basics - Forces, mass, velocity, acceleration
      ii. Integration for trajectories - Euler
      iii. Collision - Intersection of lines with triangles
      iv. GLSL mechanics - Transform Feedback, TBOs (Texture Buffer Objects)
      v. GLSL code
   c. Noise
      i. GLSL code
      ii. Bandlimited Perlin noise
      iii. Generation of noise through octave synthesis
      iv. Properties of good noise function
      v. Turbulence
      vi. Marble, Granite, Wood