Lighting and Shading wrapup
Quiz 2 prep

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Today

- Assignment 3 is now available, due March 13
- Lighting and Shading, odds and ends
  - Global illumination and ambient
  - Blinn-Phong reflection and the halfway vector
  - Toon shading
- Quiz 2 preparation

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Note about Assignment 3

- This assignment has a slightly different flavor from the previous two
  - This is mostly classical OpenGL material. Simple and lots of sample code available on the Web (some pointers next slide). Please do look at this code, but implement it yourself so that you really understand what's going on
  - Grading will focus on whether you understand the parts you implemented

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Lighting and Shading odds and ends

- Phong shading vs. Gouraud shading
  - Gouraud == per-vertex normals and illumination. Interpolate vertex colors to fragments
  - Phong == Interpolate vertex normals, per-fragment illumination
- Phong reflection vs. Phong shading
  - P. reflection == an approximation of BRDF, into specular + diffuse + ambient + …
- Global illumination and ambient
  - Ambient term is a crude approximation of global illumination

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Global Illumination
Cornell box

http://en.wikipedia.org/wiki/Cornell_box

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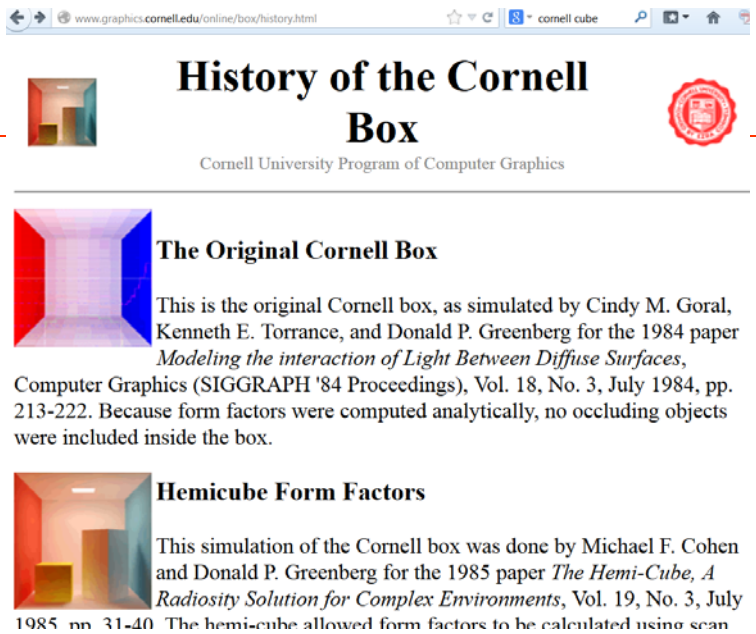

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Lighting and Shading odds and ends

- Switch to pen for
  - Blinn-Phong reflection and the halfway vector
  - Toon shading

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Lighting and Shading Resources

- There are a huge number, esp. for per-vertex lighting and shading in OpenGL. The math is mostly the same.
- Per-fragment (Phong shading) examples
  - http://www.lighthouse3d.com/tutorials/glsl-core-tutorial/lighting/
  - http://www.arcsynthesis.org/gltut/Illumination/Illumination.html
  - Sample chapter of this book is on lighting and shading http://www.packtpub.com/opengl-development-cookbook/book

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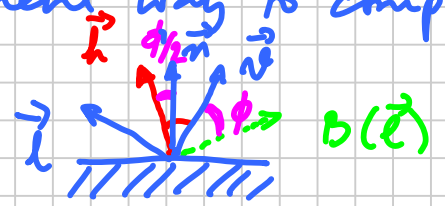
Note Title 2015-02-27

- Blinn-Phong Reflection Model

(a different way to compute the Specular term)



Phong: $s = B(\vec{e}) \cdot \vec{v}$

Halfway vector

$\vec{h} = \text{normalize}(\vec{l} + \vec{v})$ easy to compute in GLSL

Blinn: $\boxed{s = (\vec{h} \cdot \vec{n})^p}$ ← a "shininess" exponent

Produces similar results if $\vec{l}, \vec{n}, \vec{v}$ are in the same plane. But not the same.

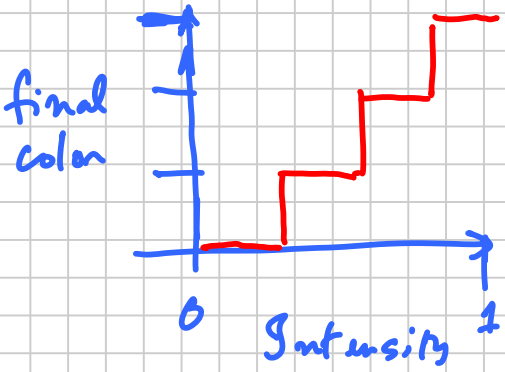
p has to be generally higher to get a comparable effect

§ Toon Shader a.k.a. Cel Shading

Two qualitative features of Cartoons

(1) Small palette of colors

Take diffuse color, and quantize it



(2) Silhouette edges

Quiz 2 Preparation

- In class, Wednesday March 4 1-1:50. Please be on time.
- Review lecture notes, and assignments.
- Everything covered in lecture could be on the exam
- Everything covered in listed textbook chapters could be on the exam
- Doing first part of Assignment 3 will be helpful

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Quiz 2 Preparation

- Textbook. Read ALL of these, except as noted
  - Ch 3.6 (transformation of normals)
  - Ch 5.4 Hierarchies of transformations
  - Ch 9.1 Interpolation (intro parts as covered on Monday)
  - Ch 10, 11.3 Projection. Mainly focus on lecture notes
  - Ch 12 From Vertex to Pixel. Skip 12.3, 12.4
  - Ch 14 Materials (shading and lighting)
- Topics from Quiz 1 will be assumed as pre-requisites (e.g., it is assumed you now know coordinate frames and how to transform them)

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Texture mapping

A brief intro and motivation

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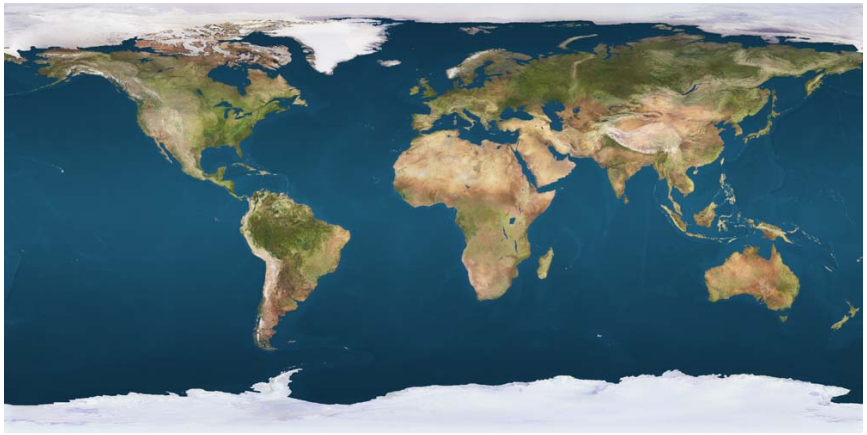
First example
How to model the earth?

Earth texture



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