CS 559: Computer Graphics

Homework 7

This homework will not be graded.

Question 1:

Describe, with one sentence for each, how flat shading, Gouraud shading interpolation and Phong shading interpolation work.

Question 2:

Write down the equation you would need to solve to find the intersection point(s) between a ray, $\mathbf{x} = \mathbf{x}_0 + t\mathbf{d}$ with $\mathbf{x}_0 = (x_0, y_0, z_0)$ and $\mathbf{d} = (d_x, d_y, d_x)$, and an infinite cone centered at the origin and aligned with the *z*-axis. The implicit equation of an infinite cone is $x^2 + y^2 - z = 0$.

Question 3:

Recall the notation used in class for light paths. For example, the OpenGL model for diffuse illumination captures LDE paths, and radiosity captures LD^*E paths.

- a. What class of paths is captured by basic ray-tracing?
- b. What class of paths is captured by bi-directional ray-tracing?
- c. Sketch a situation in which bi-directional ray-tracing will give a more accurate image than basic raytracing. Be sure to indicate:
 - the location of the light source
 - the location of the viewer
 - whether or not each surface is diffuse or specular (mirror-like)

On your diagram, draw and label a path that is captured by basic ray-tracing, and one that is captured only by bi-directional ray tracing.