

Lecture 14: Ray Tracing I – Review Questions

- What is the difference between ray casting and ray tracing? What effects can ray tracing pick up that ray casting cannot?
- What effects can ray tracing pick up that were difficult to achieve using the lighting model we have been using in the class so far (i.e., the one supported by OpenGL)?
- What is the difference between forward and backward ray tracing? Which technique do we focus on in the 3rd programming assignment? Why is this technique more practical?
- In Lecture 12, we saw the following equation for Phong Illumination:

$$I = k_a L_a + k_d (l \bullet n) \frac{L_d}{(a + br + cr^2)} + k_s (r \bullet v)^\alpha \frac{L_s}{(a + br + cr^2)}$$

Ray tracing adds two more terms to this equation: $k_r I_r + k_t I_t$

Explain the parameters in these two terms and describe how they are calculated.

- The above equation only captures attenuation along a part of the distance traveled by each ray. Sketch out a ray tracing example and work through how to make attenuation work properly (i.e., capture attenuation along the entire path followed by each ray during ray tracing).
- Derive the equations for intersecting a ray with a given sphere.
- Derive the equations to intersect a ray with a triangle.