Homework #4 | Name Key

#2 Determine the transmission vector for the pyramid.

$n_i = \sqrt{2}$

$n_r = 1$

$\theta_i = 30°$

$\vec{u} = \left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}, 0\right)$

$$\vec{T} = ? \quad \frac{n_i}{n_r} u - \left(\cos\theta_r - \frac{n_i}{n_r}\cos\theta_i\right) N$$

$$\cos\theta_r = \sqrt{1 - \left(\frac{n_i}{n_r}\right)^2 (1 - \cos^2\theta_i)} \qquad \text{Snell's law}$$

$$= \sqrt{1 - \left(\frac{\sqrt{2}}{1}\right)^2 (1 - \cos^2 30)}$$

$$= \sqrt{1 - 2\left(1 - \left(\frac{\sqrt{3}}{2}\right)^2\right)}$$

$$= \sqrt{1 - 2\left(1 - \frac{3}{4}\right)}$$

$$= \sqrt{1 - \frac{1}{2}}$$

$$= \sqrt{1/2} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$T = \frac{\sqrt{2}}{1} u - \left(\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{1}(\cos 30°)\right) N$$

$$= \sqrt{2}u - \left(\frac{\sqrt{2}}{2} - \sqrt{2}\left(\frac{\sqrt{3}}{2}\right)\right) N$$

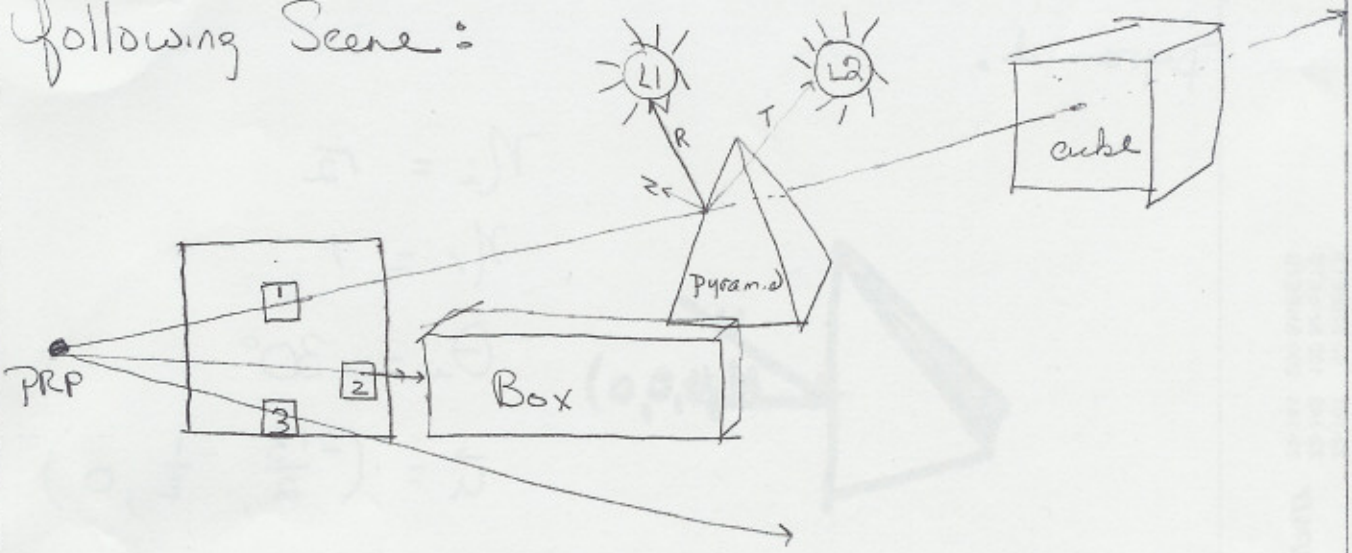
$$= \sqrt{2}u - \left(\frac{\sqrt{2}}{2} - \frac{\sqrt{6}}{2}\right) N = \sqrt{2}u - \left(\frac{\sqrt{2} - \sqrt{6}}{2}\right) N$$

$$= \left(\frac{-\sqrt{6}}{2}, \frac{-\sqrt{2}}{2}, 0\right) - \left(\frac{\sqrt{2} - \sqrt{6}}{2}, 0, 0\right) = \left(\frac{-\sqrt{6}}{2}, \frac{-\sqrt{2}}{2}, 0\right) + \left(\frac{\sqrt{6} - \sqrt{2}}{2}, 0, 0\right)$$

$$= \left(\frac{-\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}, 0\right)$$

Homework #4 Due November 12 Name Key

1) Generate the binary Ray tracing trees for the following Scene:



L1 is reflecting emitter

L2 is non reflecting emitter

Box is completely opaque

Pyramid is semi transparent

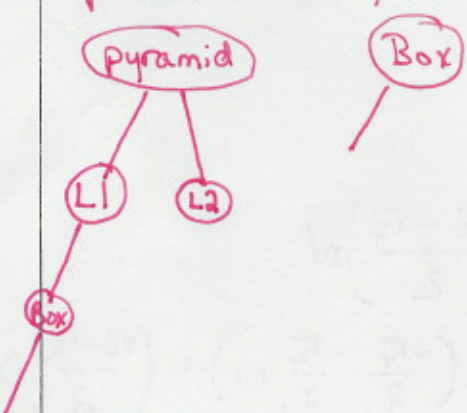
R - reflection is shown

T - refraction is shown

Cube is completely opaque

Generate Ray tracing trees for pixels 1-3

pixel 1 pixel 2 pixel 3



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