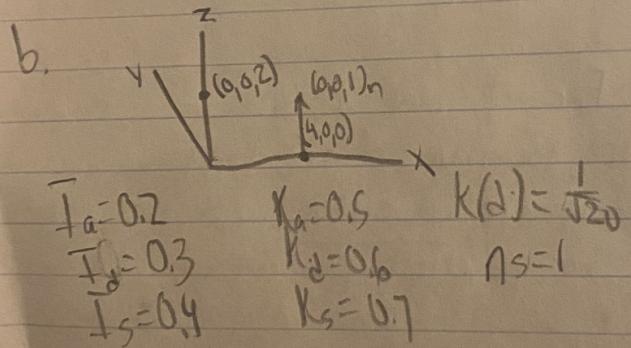


Brack Turner AS6 Questions

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CS411
AS6

1. a. For a light source to stay fixed it must be specified after the viewing transformation. Once the camera moves the light source stays at the fixed location $(0, 0, 0, 1)$. Then, apply the (MODELVIEW matrix) to the position of the light source, this is so the light source accounts for the object vertices.



$$I_{\text{ambient ref}} = I_a k_a = (0.2)(0.5) = 0.1$$

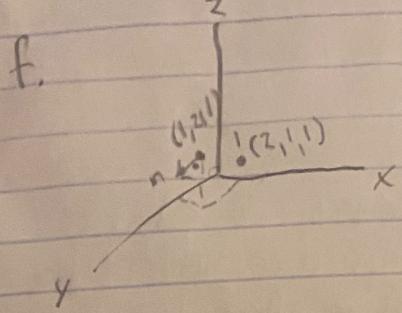
$$c. I_{\text{diffuse ref}} = I_d k_d (L \cdot N) = (0.3)(0.6)(2) = 0.36$$

$$d. I_{\text{specular ref}} = I_s k_s (N \cdot H)^{ns}$$

$$e. N = \frac{(0.4)(0.7)}{(|E_1 \times E_2| / |E_1| \times |E_2|)} = (0.28) \left(\frac{(-0.1027)}{\sqrt{68}} \right)$$

$$\begin{aligned} E_1 &= v_2 - v_1 & E_2 &= v_3 - v_1 \\ E_1 &= (3, 3, 4) & E_2 &= (6, 6, 6) \end{aligned}$$

60



f.

g. Using the Phong Model with specular reflections, the dot product $r \cdot v$ should be recalculated at every point on a surface.

$$h = \frac{1 + v}{\sqrt{1 + v}}$$

h. For distant light sources replacing the location of the light source with the direction, it is similar to parallel projections

i. It would depend on the sources in the environment as ambient light is everywhere.

$$\begin{aligned} j. I_{\text{diffuse}} &= K_d I_d \cos \theta \\ &= K_d I_d (-N \cdot L) \end{aligned}$$

$$\begin{aligned} I_{\text{specular}} &= K_s I_s (\cos \phi)^{\alpha_s} \\ &= K_s I_s (+v)^{\alpha_s} \end{aligned}$$

k. Gouraud Shading we average the normals of polygons that share a vertex while Phong Shading we interpolate normals

across each polygon instead of vertex intensities. Phong is better because it uses points along edges at the combines later during rasterization

m. Face normals are the front of a polygon and determine how light reflects on that surface. Vertex normals usually help show the surface of the connecting polygon and smoothness. Using per fragment shading we calculate vertex normals interpolating face normals along its edges.

n. Local illumination is limited because it doesn't take shadows, refractions, and blockage of light global illumination models use. Global is more realistic.

o. Ray tracing rendering is based on a synthetic camera model and determines whether a point is illuminated by the projector.

radiosity is based on energy.

Light energy is conserved and there is a energy balance for the scene.