Quiz - 1

Sec-16

Given that,

$C = (-10, -20, -100)$ | $N = (30, 10, 15)$

$S = (5, 10, 0)$

$I_p = 0.85$

$I_a = 0.2$

$P = (-5, -18, -95)$

$n = 80$

$\vec{L} = S - P = (5+5, 10+18, 0+95)$

$= (10, 28, 95)$

$\hat{L} = \frac{\vec{L}}{|\vec{L}|} = \left(\frac{10}{99.54}, \frac{28}{99.54}, \frac{95}{99.54}\right)$

$= (0.10, 0.28, 0.95)$

$\vec{N} = P - C = (-5+10, -18+20, -95+100)$

$= (5, 2, 5)$

$|\vec{N}| = \sqrt{5^2 + 2^2 + 5^2}$

$= 3\sqrt{6}$

$\hat{N} = \frac{5}{3\sqrt{6}}, \frac{2}{3\sqrt{6}}, \frac{5}{3\sqrt{6}}$

$= (0.68, 0.27, 0.68)$

$R = 2(\hat{L}\hat{N})\hat{N} - L$

$\hat{L}\hat{N} = (0.10, 0.28, 0.95) \cdot (0.68, 0.27, 0.68)$

$= 0.7896$

$2 \times \hat{L}\hat{N} = 0.7896 \times 2 = 1.5792$

$$2(\hat{L}\hat{N})\hat{N} = 1.5792 \times (0.68, 0.27, 0.68)$$

$$= (1.074, 0.426, 1.074)$$

$$R = 2(\hat{L}\hat{N})\hat{N} - L$$

$$= (1.074, 0.426, 1.074) - (0.10, 0.28, 0.95)$$

$$= (0.974, 0.146, 0.124)$$

$$\vec{V} = V - P = (30, 10, 15) - (-5, -18, -95) = (35, 28, 110)$$

$$I = I_a k_a + I_p K_s \max\{(RV)^n, 0\}$$

$$= (0.2 \times 0.12) + 0.85 \times 0.7 \times \max\{(32.4)^{80}, 0\}$$

$$= 0.024 + 0.595 \times \max\{(32.4)^{80}, 0\}$$

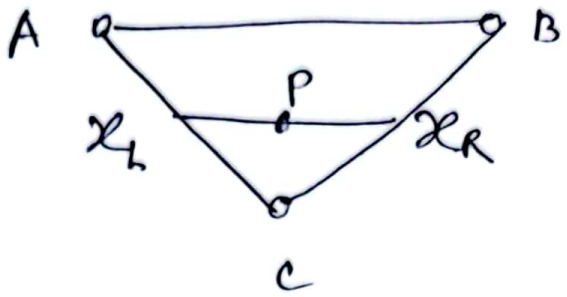
extra large value; okay to keep the ans till here.

Ans.

$$R.V = (0.974, 0.146, 0.124).(30, 10, 15)$$

$$= 32.4$$

(2) (A) Gouraud Shading.



$$x_L = A + (C - A) \times \frac{D_{AX_L}}{D_{AC}}$$

$$x_R = B + (C - B) \times \frac{D_{BX_R}}{D_{BC}}$$

$$P = x_L + (x_R - x_L) \times \frac{D_{X_L P}}{D_{X_L X_R}}$$

(B) If there's a spot light at P, Gouraud Shading will not be able to detect the spot light.

Since, this shading uses an approach where only the vertices are chosen and & color intensities are calculated using the phong's reflection model. After that all other pixels intensities are found by using interpolation and the intensities of the vertices. Since, the spot light does not fall on any vertices, Gouraud Shading won't be able to ~~find~~ detect it.

(3) Check Slides