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Problem 1

$$\begin{aligned} \text{a) } I &= I_1 + I_2 \\ &= \frac{\rho'}{\pi} K_1 (n \cdot s_1) + \frac{\rho'}{\pi} K_2 (n \cdot s_2) \quad \text{since the intensities} \\ &\quad K_1 = K_2 \\ &= \frac{\rho'}{\pi} K (n \cdot s_1) + \frac{\rho'}{\pi} K (n \cdot s_2) \\ &= \frac{\rho'}{\pi} K (n \cdot s_1 + n \cdot s_2) \\ &= \frac{\rho'}{\pi} K (n \cdot (s_1 + s_2)) \\ &= \rho (n \cdot (s_1 + s_2)) \quad \text{The light source can be viewed as} \\ &\quad \text{coming from direction } s_1 + s_2 \end{aligned}$$

$$\begin{aligned} b \quad I &= I_1 + I_2 \\ &= \frac{\rho'}{\pi} k_1 (n \cdot s_1) + \frac{\rho'}{\pi} k_2 (n \cdot s_2) \\ &= \frac{\rho'}{\pi} (k_1 (n \cdot s_1) + k_2 (n \cdot s_2)) \\ &= \frac{\rho'}{\pi} (n \cdot (s_1 k_1 + s_2 k_2)) \end{aligned}$$

Let $S_3 k_3 = S_1 k_1 + S_2 k_2$ source direction Intensity

$= \frac{f' k_3 (h \cdot S_3)}{\pi}$ \swarrow \downarrow

$S_3 = \frac{S_1 k_1 + S_2 k_2}{\|S_1 k_1 + S_2 k_2\|}$ $k_3 = \|S_1 k_1 + S_2 k_2\|$