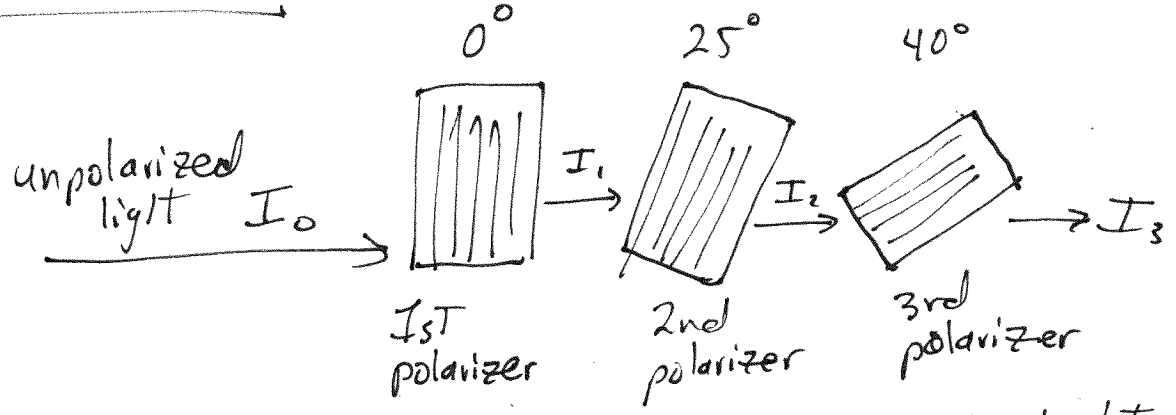
Ch. 1 Prob. 70



- Going Through the first polarizer, the light goes from unpolarized to polarized. This reduces the intensity by 1/2.

$$\therefore \quad I_1 = \frac{1}{2} I_0$$

- Going Through the 2nd polarizer, the light shifts its polarization by 25°. Using Malus Law gives

$$I_2 = I_1 \cos^2(25) = I_1 \cdot (0.8214)$$

$$\text{so} \quad I_2 = \left(\frac{1}{2} I_0\right)(0.8214) = 0.4107 I_0$$

- Going Through the 3rd polarizer, the light shifts its polarization by $40° - 25° = 15°$. Using Malus Law gives

$$I_3 = I_2 \cos^2(15) = I_2 \cdot (0.9330)$$

$$\text{so} \quad I_3 = (0.4107 I_0)(0.9330) = 0.3832 I_0$$

$I_3 = 0.3832 I_0$ or 38.32% of its original intensity