

Solution to HW6

8.16 $\frac{I_{out}}{I_{in}} = \cos^2(40 - 10)\cos^2(60 - 10) = 0.31.$

8.21 Output of the rotating polarizer: $I_{out2} = I_{out1}\cos^2(\omega t),$

Output of the third polarizer: $I_{out3} = I_{out2}\cos^2\left(\frac{\pi}{2} - \omega t\right) = \frac{I_{out1}}{8}[1 - \cos(4\omega t)].$

8.37 Left-handed elliptical polarization. (Any reasonable analysis would be fine)

8.42 Comparison of the irradiance output can distinguish the polarizer and the wave plate.

8.53 $\hat{E}_1 \cdot \hat{E}_2^\dagger = 0, \hat{E}_2 = \begin{pmatrix} 2 \\ i \end{pmatrix}.$

8.72 (a) $E_{out} = \frac{1}{2\sqrt{2}} \begin{pmatrix} 1 + \sqrt{3} \\ 1 - \sqrt{3} \end{pmatrix},$ polarization direction is $\theta = -15^\circ$ with respect to x axis;

(b) $E_{out} = \frac{1}{2\sqrt{2}} \begin{pmatrix} -1 + \sqrt{3} \\ 1 + \sqrt{3} \end{pmatrix},$ polarization direction is $\theta = 75^\circ$ with respect to x axis;

(c) Rotation angle is $-15^\circ.$