

PHYS 452 Chapter 8 Homework

Name (print): _____

Signature _____

Problem 1 _____

Problem 2 _____

Problem 3 _____

Problem 4 _____

Problem 5 _____

Total _____

Directions: You know the drill!

Problem 1. Specify the polarization mode for each of the following Jones vectors (justify your answer):

- $\begin{bmatrix} 3i \\ i \end{bmatrix}$

- $\begin{bmatrix} i \\ 1 \end{bmatrix}$

- $\begin{bmatrix} 5i \\ 0 \end{bmatrix}$

- $\begin{bmatrix} 4i \\ 5 \end{bmatrix}$

- $\begin{bmatrix} 2 \\ 2i \end{bmatrix}$

- $\begin{bmatrix} 2 \\ 3 \end{bmatrix}$

- $\begin{bmatrix} 2 \\ 6+8i \end{bmatrix}$

Problem 2. Linearly polarized light whose \mathbf{E} is inclined $+30^\circ$ relative to the x-axis is transmitted by a QWP with the FA (fast axis) horizontal. Describe the polarization mode of the product light.

Problem 3. A light beam passes consecutively through (1) a linear polarizer with TA at 45° clockwise from vertical, (2) a QWP with FA vertical, (3) a linear polarizer with TA horizontal, (4) a HWP with FA horizontal, (5) a linear polarizer with TA vertical. What is the nature of the light transmitted through this system.

Problem 4. Determine the state of polarization of circularly polarized light after it is passed normally through (a) a QWP; (b) an eight-wave plate using the matrix method.

Problem 5. Write the equations for the electric fields of the following waves in exponential form:

- A linearly polarized wave traveling in the x -direction. The \mathbf{E} -vector makes an angle of 30° relative to the y -axis.
- A right elliptically polarized wave traveling in the y -direction. The major axis of the ellipse is in the z -direction and is twice the minor axis.
- A linearly polarized wave traveling in the xy -plane in a direction making an angle of 45° relative to the x -axis. The direction of polarization is in the z -direction.