Initially unpolarized light passes through four different polarizers, all of them letting through light polarized in a horizontal plane (like polarizers sitting on an overhead projector). The first lets through light polarized in the \(+x\) direction, the second light polarized in the direction \(\theta = 45^\circ\) (measured, as always, counterclockwise from the \(+x\) axis), the third light polarized in the \(+y\) direction, and the fourth light polarized in the direction \(\theta = 150^\circ\).

Determine the fraction of the initial light (call its intensity 100\%) that passes through each of these four polarizers in turn. (The fraction continually decreases, or possibly remains the same.)

The angles of the four polarizers are, respectively, \(0^\circ\), \(45^\circ\), \(90^\circ\), and \(150^\circ\).

Initially: 100\%, randomly polarized
Through #1: 50\%, now along \(+x\) (0\°)
Through #2: \((50\%) \cos^2 (45^\circ - 0^\circ) = (50\%)(0.50) = 25\%\)
Through #3: \((25\%) \cos^2 (90^\circ - 45^\circ) = (25\%)(0.50) = 12.5\%\)
Through #4: \((12.5\%) \cos^2 (150^\circ - 90^\circ) = (12.5\%)(0.25) = 3.125\%\)