c) (2 points) Now we calculate the radiated power:

$$\begin{aligned}\frac{dP}{d\Omega} =& \frac{c}{8\pi}\frac{\omega k}{c} Re[r^2 \vec{n}\cdot(\vec{A}\times(\vec{n}\times\vec{A}))] \\ =& \frac{c}{8\pi}\frac{\omega k}{c}\frac{I_0^2\lambda^2}{\pi^2 c^2 r^2} r^2 \frac{\cos^2[(\pi/2)(\cos\theta)]}{\sin^4\theta}\vec{n}\cdot(\vec{e}_z\times(\vec{n}\times\vec{e}_z)) \\ =& \frac{I_0^2}{2\pi c}\frac{\cos^2[(\pi/2)\cos\theta]}{\sin^4\theta}\vec{n}\cdot(\vec{n}-\vec{e}_z(\vec{n}\cdot\vec{e}_z)) = \frac{I_0^2}{2\pi c}\frac{\cos^2[(\pi/2)\cos\theta]}{\sin^4\theta}(1-\cos^2\theta) \\ =& \frac{I_0^2}{2\pi c}\frac{\cos^2[(\pi/2)\cos\theta]}{\sin^2\theta}.\end{aligned}$$