Problem 1: Griffiths 9.33 Suppose

\[ E(r, \theta, \phi, t) = E_0 \frac{\sin \theta}{r} \left[ \cos(kt - \omega t) - \left( \frac{1}{kr} \right) \sin(kt - \omega t) \right] \hat{\phi}, \text{ with } \frac{\omega}{k} = c \]

(a) Show that \( E \) obeys all four of Maxwell's equations, in vacuum, and find the associated magnetic field.

(b) Calculate the Poynting vector and the intensity vector \( I \).

(c) Determine the total power radiated.

Problem 1: Griffiths 9.36 Light from an aquarium goes from water \((n = 4/3)\) through a plane of glass \((n = 3/2)\) into air \((n = 1)\). Assuming it’s a monochromatic plane wave and that it strikes the glass at normal incidence, find the minimum and maximum transmission coefficients. You can see the fish clearly; how well can it see you?

Note: Transmission coefficient is given in the book:

\[ T^{-1} = \frac{1}{4n_1n_3} \left[ (n_1 + n_3)^2 + \frac{(n_1^2 - n_2^2)(n_2^2 - n_3^2)}{n_2^2} \sin^2 \left( \frac{n_2 \omega d}{c} \right) \right] \]