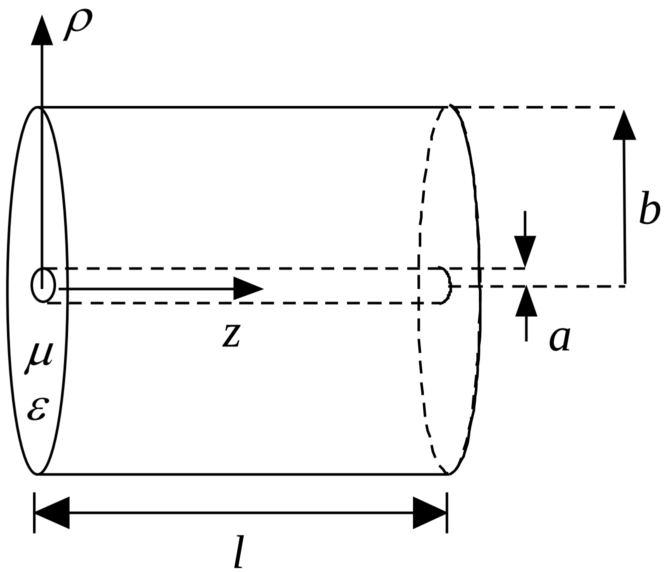
ECE 546 HOMEWORK No 1 Due Wednesday, February 7, 2024

1. Consider the coaxial system shown below. The solid inner conductor has radius a. The outer conductor has radius b. The medium between the two conductors has permittivity ε and permeability μ.



(a) Show that the inductance per-unit-length is given by:

$$L = \frac{\mu}{2\pi} \ln\left(\frac{b}{a}\right)$$

(b) Show that the capacitance per-unit-length is given by:

$$C = \frac{2\pi\varepsilon}{\ln(b/a)}$$