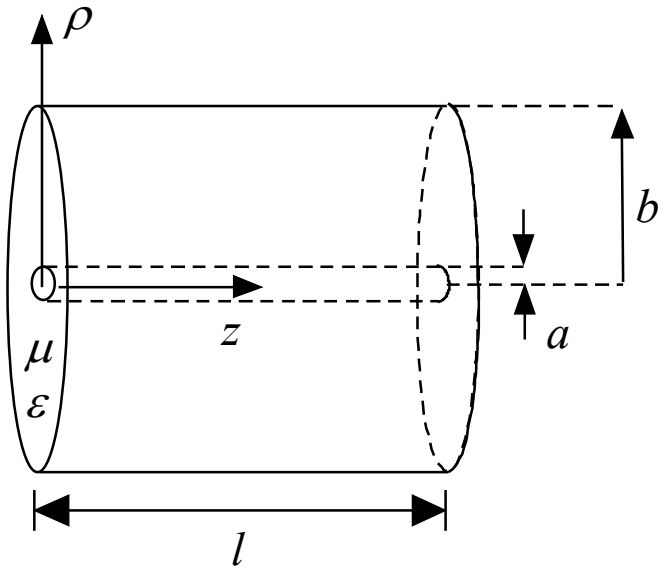
ECE 546 HOMEWORK No 1 Due Friday, February 13, 2026

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:

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

(c) Assuming you have a connector with dimensions a = 1mm, b = 2mm and a dielectric constant ε_r = 2.1, what is the maximum frequency at which this connector can be used?