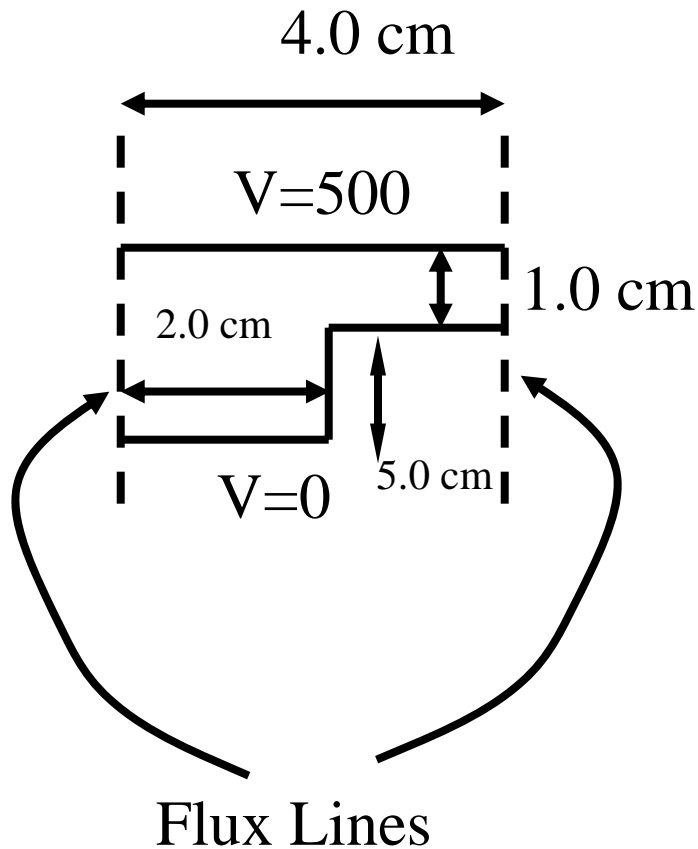


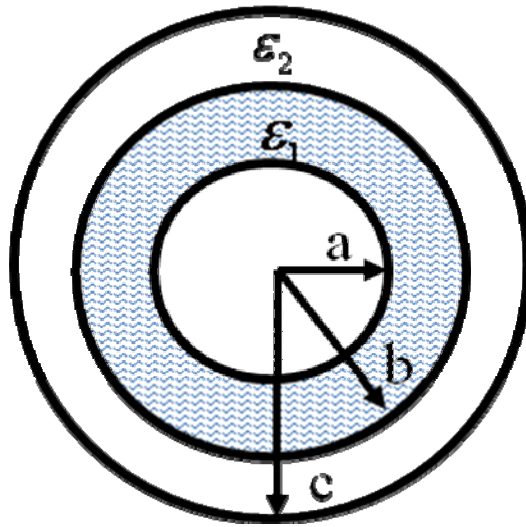
**Fields and Waves I**  
**Homework 5**  
**ECSE 2100 Fall 2008**

Use the spreadsheet method for solving Laplace's equation to find the capacitance per meter depth of the object we solved in class. The relative dielectric constant is 1.0. The geometry is illustrated below:

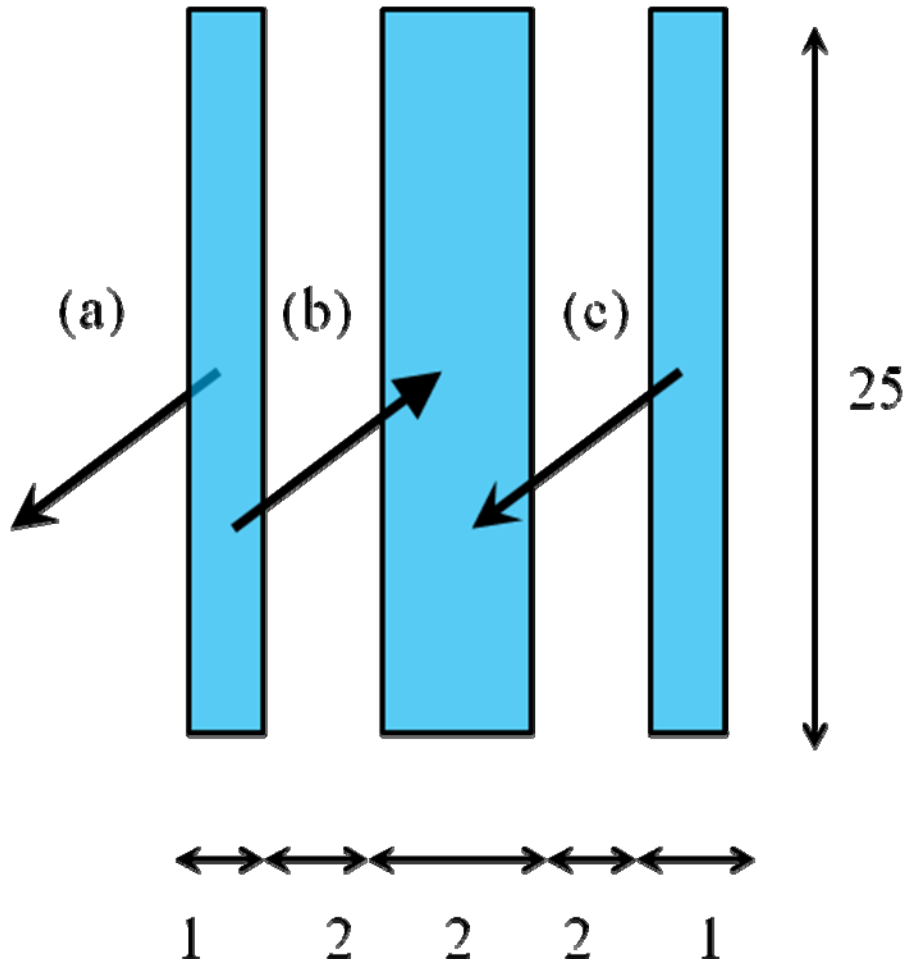


**Fields and Waves I**  
**Homework 5**  
**ECSE 2100 Fall 2008**

The voltage on the inner conductor is 100 Volts and the outer conductor is grounded, the relative dielectric constant of material 1 is 4.2 and that of material 2 is 3.7. Let  $a = 1.0$  cm,  $b = 2.0$  cm. and  $c = 3.0$  cm. Find the potential, electric field and flux density in all regions. Find the capacitance per meter depth.



**Fields and Waves I**  
**Homework 5**  
**ECSE 2100 Fall 2008**



A plant for Aluminum electrolysis is illustrated above. There are 3 long metal plate electrodes. The center one carries 15,000 Amps of dc (into the page) and the outer 2 carry 7500 Amps dc each (out of the page). Dimensions are in centimeters. Find the approximate flux densities at points (a), (b) and (c).