

### Special Problem 5-4.6

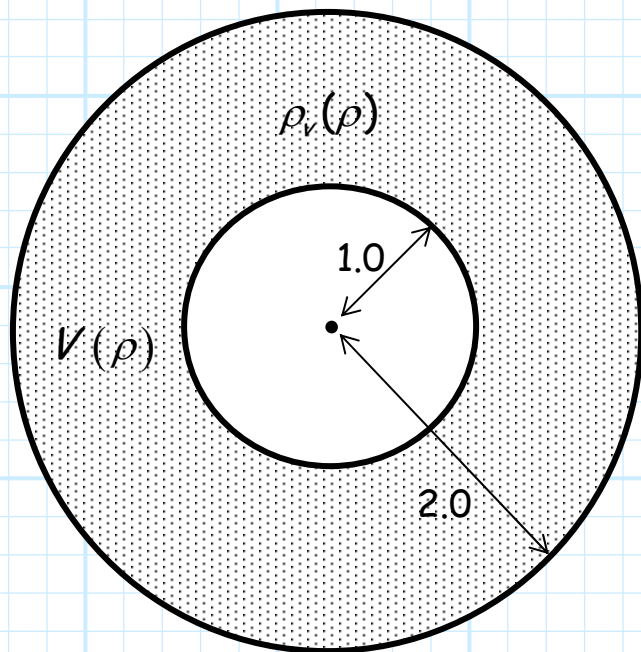
A hollow conducting cylinder, with inner **radius 2 m**, is centered along the z-axis. Every point on this cylinder has an **electric potential of  $4\ln[2] + 6$  V**.

Another hollow conducting cylinder, with outer **radius 1 m**, is also centered along the z-axis. Every point on this cylinder has an **electric potential of 4.0 V**.

The region between the cylinders (i.e.,  $1.0 < \rho < 2.0$ ) is filled with **free charge**, with a density of:

$$\rho_v(\rho) = \frac{-2\epsilon_0}{\rho} \quad \left[ \frac{C}{m^3} \right]$$

Determine the **electric potential function  $V(\rho)$**  in the region between the cylinders.



**Hint:** Recall that:

$$\int \frac{dx}{x} = \ln[x] \quad \text{and} \quad \ln[1] = 0$$