Special Problem 5-4.2

A conducting plate lies on the half-plane $\phi = 0$. It has an electric potential of 5V.

Another conducting plate lies on the half-plane $\phi = 90^\circ$. It has an electric potential of –5V.

Filling the volume between the plates is a dielectric wedge with a **relative** permittivity of 3.0. The plates are **not** touching, but extend to **infinity** in both the $\hat{a}_\rho$ and $\hat{a}_z$ directions (sort of like an **infinite door hinge**!).

Find:

1. The electric potential field $V(\bar{r})$ within the dielectric.

2. The electric field within the dielectric.

3. The electric flux density within the dielectric.

4. The surface charge density on **each** plate.

BIG HINT: The electric potential field is a function of ϕ **only** (e.g., $V(\bar{r}) = V(\phi)$)!!