Special Problem 5-4.3

A **conducting** plate lies on the **half-plane** $\phi = 0$. It has an **electric potential** of 0 V. **Another** conducting plate lies on the half-plane $\phi = \pi/4$. It has an electric potential of $\pi/4$ V.

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**!).

Filling the volume between the plates is **free charge** with a density:

$$\rho_v(\bar{r}) = \frac{4\varepsilon_0}{\pi}\frac{1}{\rho^2} \quad \left[\frac{C}{m^3}\right]$$

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