Special Problem 8-3.7

In free-space there exists a circular cylinder of **radius 2 m,** infinite length, and centered along the z- axis.

On the **surface** of this cylinder, there exists a **surface** current density:

$$\mathbf{J}_s(\bar{r}) = 2\,\hat{\mathbf{a}}_\phi + 3\,\hat{\mathbf{a}}_z \qquad A/m$$

Inside the cylinder, there exist a magnetic field:

$$\mathbf{H}_2(\bar{r}) = 5\,\hat{\mathbf{a}}_z \qquad A/m$$

Outside the cylinder, the exists a magnetic field of the form:

$$\mathbf{H}_1(\bar{r}) = \frac{A}{\rho}\hat{\mathbf{a}}_\phi + B\,\hat{\mathbf{a}}_z \qquad A/m$$

where *A* and *B* are **unknown scalar values**.

Apply **boundary conditions** to determine the unknown scalar values *A* and *B*.