Special Problem 5-2.2

A resistor with length 6 and radius 1 is centered at the origin and aligned with the z-axis.

This cylinder is made of material with conductivity:

\[
\sigma = \frac{3}{\pi (1 + 3z^2)} \left[ \frac{1}{\Omega \cdot m} \right]
\]

Say current is flowing in this resistor with a density:

\[
J(\vec{r}) = 3 \hat{a}_z \left[ \text{Amps} / \text{m}^2 \right]
\]

Determine the resistance of this cylinder (Hint: it has a numerical value!).