5-5)

Consider an infinitely long straight cylinder of radius R carrying a current I_o. The current is not uniform in cross-section. The density of current *per* unit of cross-sectional area, J, is

$$J = \frac{2I_o}{\pi R^4} r^2 \quad .$$

A) Verify that the total current in the wire is in fact I_o.

B) Find the magnitude of the magnetic field as a function of r, the distance from the cylinder's axis, using Ampere's Law, for $0 \leq r \leq R$.

C) Find the magnitude of the magnetic field as a function of r, the distance from the cylinder's axis, using Ampere's Law, for $r \geq R$.