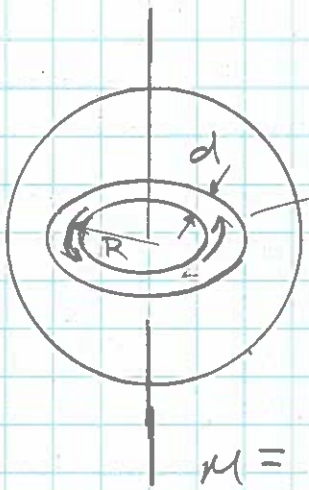

Current loop
$R = 1500$ km
$d = 1000$ km

$\mu = 8 \times 10^{22}\ A m^2$

a.) Dipole moment, $\mu = IA$ where $A = \pi R^2$

$$I = \frac{\mu}{\pi R^2} = \underline{1.132 \times 10^{10}\ A}$$

b.) Current Density, $J = \dfrac{I}{\text{loop cross section}}$

$$= \frac{I}{\pi (d/2)^2}$$

$$= 0.0144\ \frac{A}{m^2}$$

c.) For $I = 1A$ in a $d = 1mm$ wire:

$$J_{wire} = \frac{I}{A} = \frac{I}{\pi (\frac{d}{2})^2} = 1.273 \times 10^6\ \frac{A}{m^2}$$