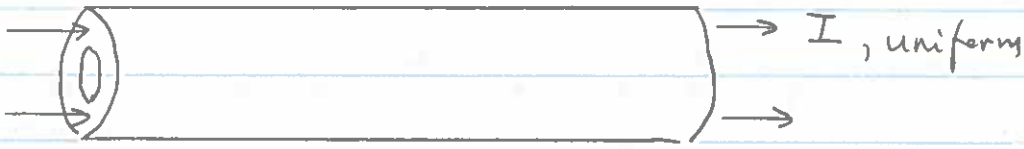
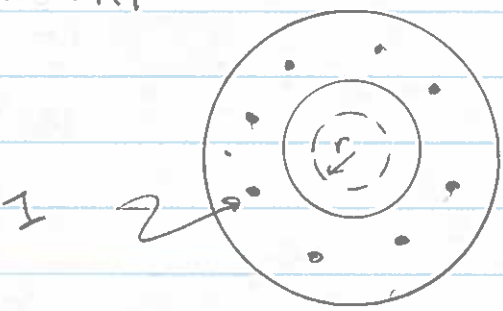


Cross Section:

what does field look like?

a.) $r < R_1$

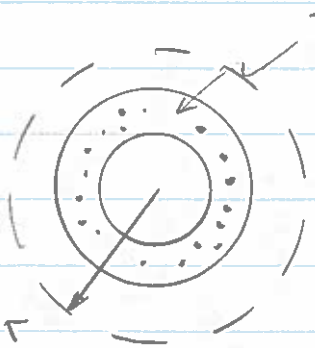


$\oint \vec{B} \cdot d\vec{s} = \mu_0 I_{through}$

$B 2\pi r = 0$

$B = 0$

c.) $r > R_2$

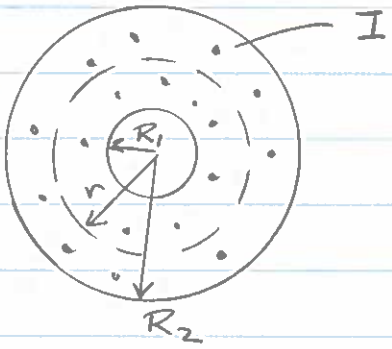


$\oint \vec{B} \cdot d\vec{s} = \mu_0 I_{through}$

$B 2\pi r = \mu_0 I$

$B = \frac{\mu_0 I}{2\pi r}$

b.) $R_1 \le r \le R_2$



$$\oint \vec{B} \cdot d\vec{s} = \mu_0 I_{through}$$

Now, $I_{through} = J\,(\text{area through})$

$$= \frac{I}{(\pi R_2^2 - \pi R_1^2)} (\pi r^2 - \pi R_1^2)$$

$$= I\left(\frac{r^2 - R_1^2}{R_2^2 - R_1^2}\right)$$

Now

$$B\,2\pi r = \mu_0 I \left(\frac{r^2 - R_1^2}{R_2^2 - R_1^2}\right)$$

$$\therefore \quad B = \frac{\mu_0 I}{2\pi r}\left\{\frac{r^2 - R_1^2}{R_2^2 - R_1^2}\right\}$$