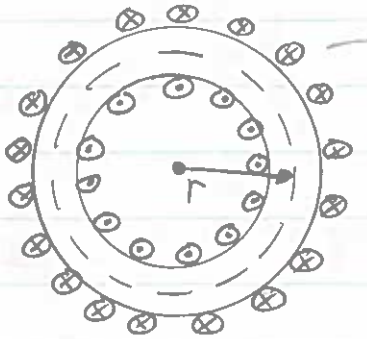
29-54

1

TORUS CROSS SECTION:



I, N turns

a.) $\vec{B}$ must be circular – picture bending a solenoid into a circle. Rotations about axis I leave it unchanged.

b.) Apply Ampere's law to circle of radius r:

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

$$B 2\pi r = \mu_0 N I$$

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

c.) Unlike the solenoid, the torus field is not uniform – it's stronger nearer to the center.