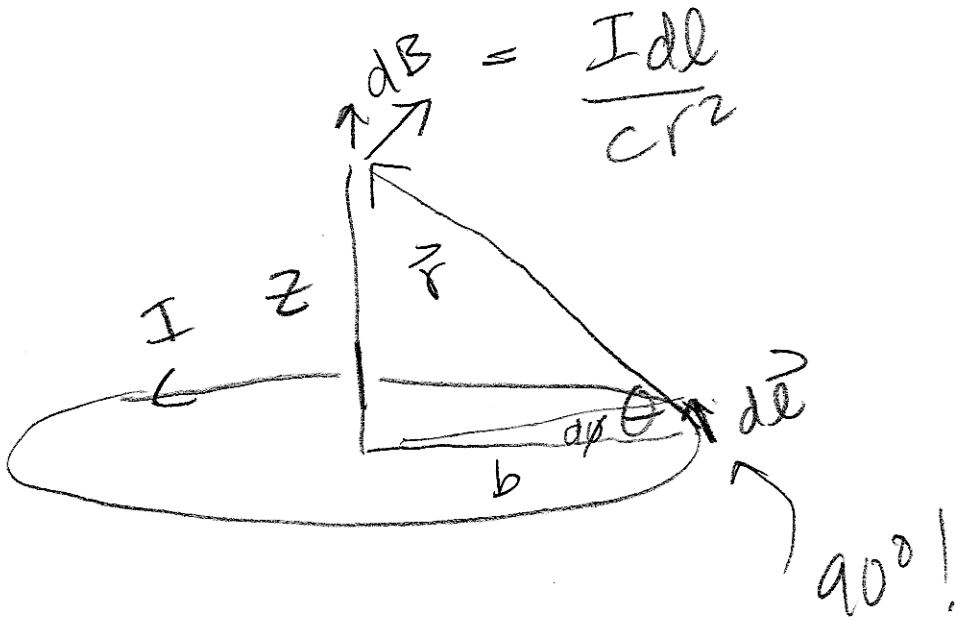


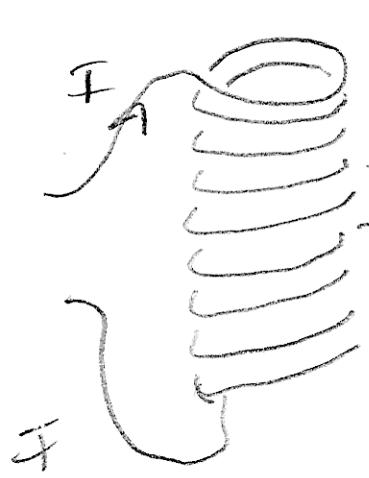
$$dB_z = \frac{I\,dl}{cr^2} \times \cos\theta$$

$$= \frac{I\,dl}{cr^2} \cdot \frac{b}{\sqrt{b^2+z^2}}$$

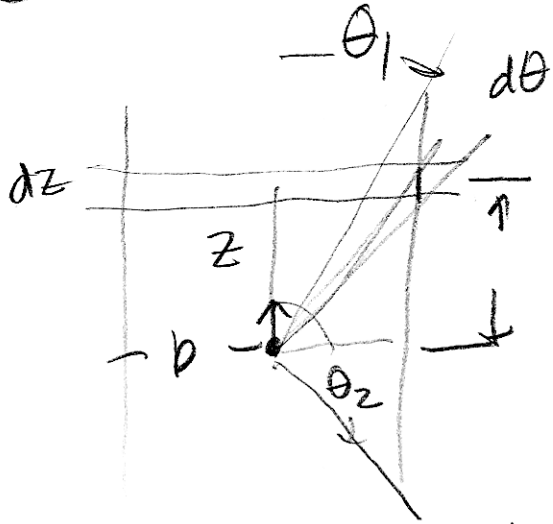
$$= \frac{I\,b\,d\phi}{c(b^2+z^2)} \frac{b}{\sqrt{b^2+z^2}}$$

$$B_z = \frac{2\pi I b^2}{c(b^2+z^2)^{3/2}} \qquad z=0$$

$$B_z = \frac{2\pi I}{cb}$$



∈ pile lots of loops on top of one another.



$$\tan\theta = \frac{b}{z}$$

work out direction in pic

$$dz = b\,d\left(\frac{\cos\theta}{\sin\theta}\right) = -b\,\frac{d\theta}{\sin^2\theta}$$

$$\text{current} = nI\,dz = \frac{nI\,b\,d\theta}{\sin^2\theta}$$

$$dB_z = \frac{2\pi}{c}\,\frac{b^2}{r^3}\cdot\frac{nI\,b\,d\theta}{\sin^2\theta}$$

$$r\sin\theta = b$$

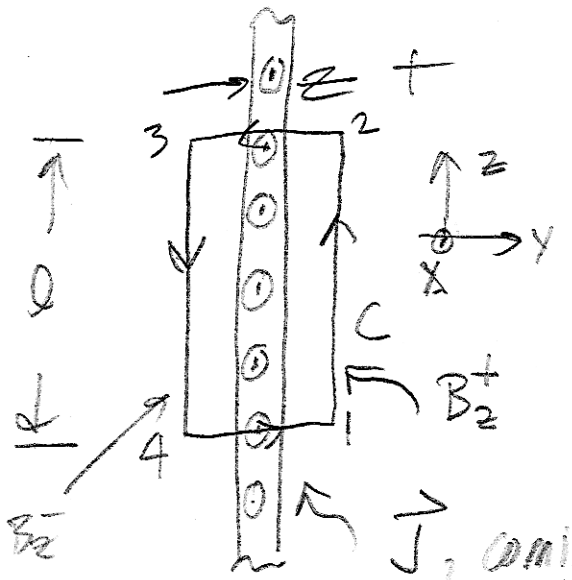
$$= \frac{2\pi}{c}\,\frac{b^3}{b^3}\cdot\sin\theta\cdot nI\,d\theta$$

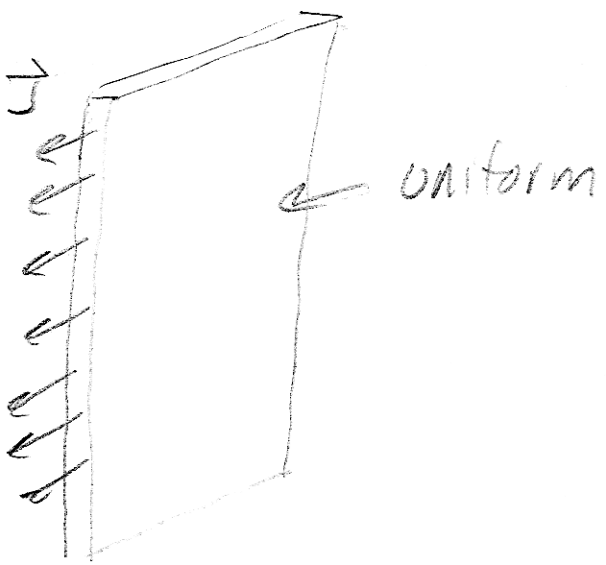
$$dB_z = \frac{2\pi}{c}\,nI\,\sin\theta\,d\theta$$

∞ long.

$$B_z = \frac{2\pi}{c}\,nI\,(\cos\theta_1 - \cos\theta_2) \Rightarrow \frac{4\pi}{c}\,nI$$

Current Sheets and Magnetic Pressure.





$|\vec{J}| \rightarrow \frac{\text{esu}}{\text{sec cm}^2}$

$|\vec{J}| \cdot t = \mathcal{J} \rightarrow \frac{\text{esu}}{\text{sec cm}}$ current/length

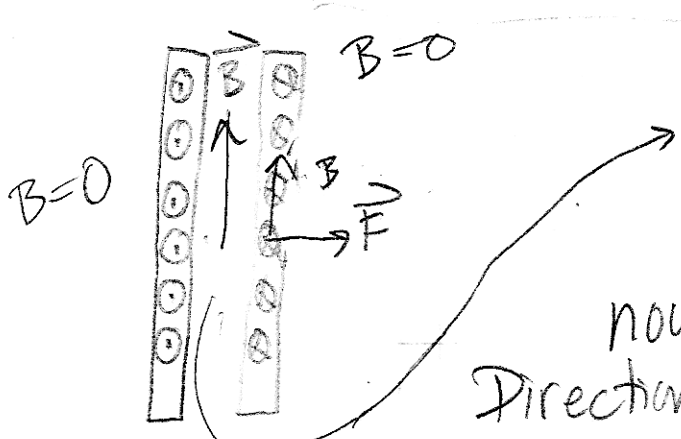
$$\int_C \vec{B} \cdot d\vec{\ell} = \left(B_z^+ - B_z^-\right) \cdot \ell = \frac{4\pi}{c} j \cdot \ell$$

$j \cdot \ell = I$

B_z^-: line opposite direction

$2 \rightarrow 3$, $4 \rightarrow 1$: $\vec{B} \perp$ line

$$B_z^+ - B_z^- = \frac{4\pi}{c} \mathcal{J}$$



now work out forces.
Direction: outward!