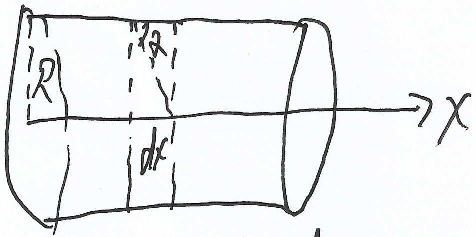
6. Дано:

магнитная индукция в центре — ?

$$B=\int dB\sin\varphi = \int_0^{\pi} \frac{\mu\mu_0 I}{2\pi^2 R}\sin\varphi\, d\varphi = \frac{\mu\mu_0 I}{\pi^2 R}$$

7. Дано:



$$dB = \frac{n\mu_0\mu I}{4\pi}\cdot\frac{R\, d\varphi\, dx}{(\sqrt{R^2+x^2})^2}\cdot\sin\alpha.\quad \text{где } \sin\alpha = \frac{R}{\sqrt{R^2+x^2}}$$

$$B=\frac{n\mu_0\mu I}{4\pi}\int_0^{2\pi} R\, d\varphi \int_{-\frac{l}{2}}^{\frac{l}{2}}\frac{dl}{(R^2+l^2)^{\frac{3}{2}}}\cdot R = \frac{n\mu_0\mu I R^2}{2}\int_{-\frac{l}{2}}^{\frac{l}{2}}\frac{dl}{(R^2+l^2)^{\frac{3}{2}}}$$

пусть $l = R\,tg\,t \Rightarrow dl = \frac{R}{\cos^2 t}dt$

$$= \frac{n\mu_0\mu I R^2}{2\cancel{4\pi}} \int_{-arctg\frac{l}{2R}}^{arctg\frac{l}{2R}} \frac{R\, dt}{(\frac{R^2}{\cos^2 t})^{\frac{3}{2}}\cdot\cos^2 t} = \frac{n\mu\mu_0 I \cancel{R^2}}{2\cancel{4\pi}}\int_{-arctg\frac{l}{2R}}^{arctg\frac{l}{2R}} \cos t\, dt$$

$$= n\mu\mu_0 I \sin t$$

$$= \frac{n\mu_0\mu I}{\sqrt{1+(\frac{2R}{l})^2}}$$