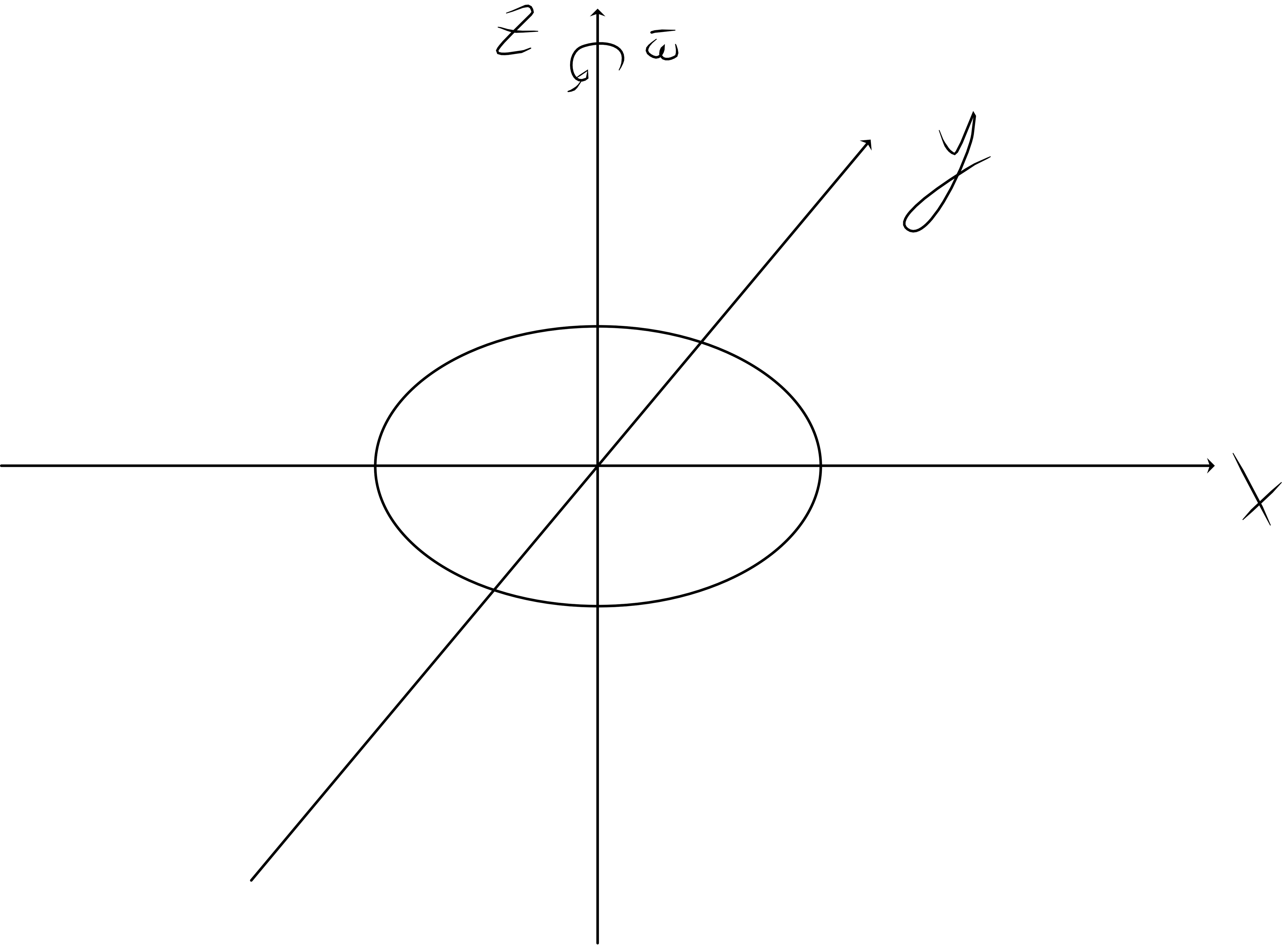

Obręcz:

$$\bar{B} = \frac{\mu_0 I r^3}{2\left(r^2+z^2\right)^{\frac{3}{2}}}$$

$$d\bar{B} = \frac{\mu_0 dI\, r^3}{2\left(r^2+z^2\right)^{\frac{3}{2}}}$$

$$dI = \frac{dQ}{dt} = \frac{\sigma r\, dr\, d\varphi}{dt} = \sigma \omega r\, dr$$

$$d\bar{B} = \frac{\mu_0 \sigma \omega}{2} \cdot \frac{r^3 dr}{\sqrt{r^2+z^2}^{\,3}}$$

$$\bar{B} = \frac{\mu_0 \sigma \omega}{2} \int_{R_2}^{R_1} \frac{r^3 dr}{\sqrt{r^2+z^2}^{\,3}} = \left\{ \begin{array}{l} r = z \tan\theta \\ dr = z \sec^2\theta\, d\theta \end{array} \right\} = \frac{\mu_0 \sigma \omega}{2} \int_{\theta_2}^{\theta_1} \frac{\cancel{z^3} \tan^3\theta \cdot z \cancel{\sec^2\theta}}{\cancel{z^3} \sqrt{1+\tan^2\theta}^{\,\cancel{3}}} d\theta =$$

$$= \frac{\mu_0 \sigma \omega z}{2} \int_{\theta_2}^{\theta_1} \frac{\tan^3\theta}{\sec\theta} d\theta = \frac{\mu_0 \sigma \omega z}{2} \int_{\theta_2}^{\theta_1} \frac{\sin^3\theta}{\cos^2\theta} d\theta = \frac{\mu_0 \sigma \omega z}{2} \int_{\theta_2}^{\theta_1} \frac{\sin\theta}{\cos^2\theta} - \sin\theta\, d\theta =$$

$$= \frac{\mu_0 \sigma \omega z}{2} \left(\sec\theta + \cos\theta\right)\Big|_{\theta_2}^{\theta_1} = \left\{ \begin{array}{l} \tan\theta = \frac{r}{z} \\ \cos\theta = \frac{z}{\sqrt{r^2+z^2}} \end{array} \right\} = \frac{\mu_0 \sigma \omega}{2} \left(\sqrt{R_1^2+z^2} + \frac{z^2}{\sqrt{R_1^2+z^2}} - \sqrt{R_2^2+z^2} - \frac{z^2}{\sqrt{R_2^2+z^2}} \right) =$$

$$= \frac{\mu_0 \sigma \omega}{2} \left(\frac{R_1^2 + 2z^2}{\sqrt{R_1^2+z^2}} - \frac{R_2^2 + 2z^2}{\sqrt{R_2^2+z^2}} \right) \hat{e}_z$$

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