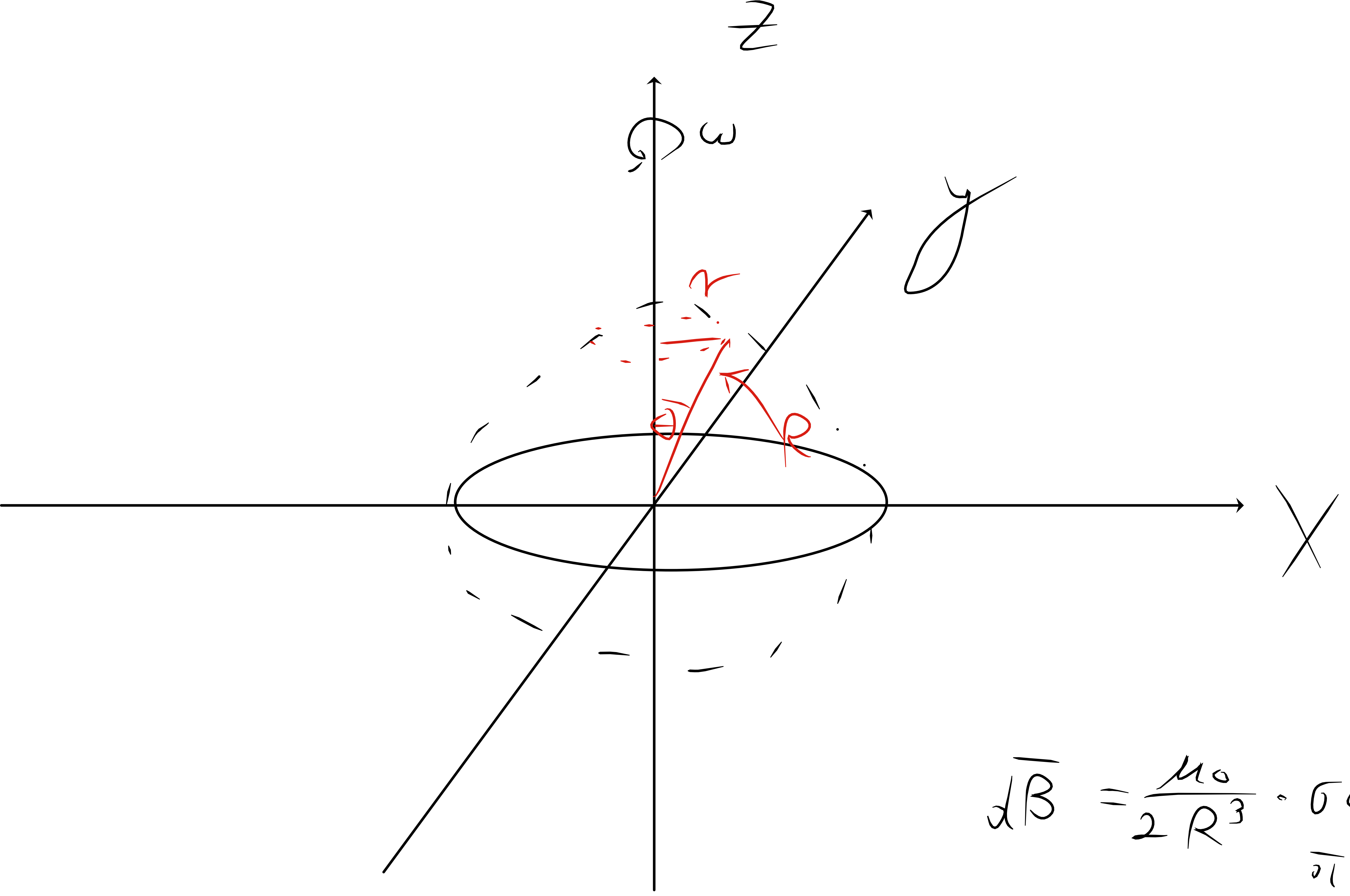

$$d\bar{B} = \frac{\mu_0 \, dI \, r^2}{2\sqrt{r^2+z^2}^{\,3}}$$

$$z = R\cos\theta$$

$$r = R\sin\theta$$

$$dI = \frac{dQ}{dt} = \frac{\sigma \cdot R^2 \sin\theta \, d\theta \, d\varphi}{dt} = \sigma\omega R^2 \sin\theta \, d\theta$$

$$d\bar{B} = \frac{\mu_0}{2R^3} \cdot \sigma\omega R^2 \sin\theta \, d\theta \cdot R^2 \sin^2\theta = \frac{\mu_0 \sigma \omega R}{2} \sin^3\theta \, d\theta \, \hat{e}_z$$

$$\bar{B} = \frac{\mu_0 \sigma \omega R}{2} \int_0^{\pi} \sin^3\theta \, d\theta = \frac{\mu_0 \sigma \omega R}{2} \int_0^{\pi} (1-\cos^2\theta)\sin\theta \, d\theta = \left\{ \begin{array}{l} u = \cos\theta \\ du = -\sin\theta \, d\theta \end{array} \right\} =$$

$$= \frac{\mu_0 \sigma \omega R}{2} \int_1^{-1} (u^2-1) \, du = \frac{\mu_0 \sigma \omega R}{2} \left(\frac{u^3}{3} - u \right) \Bigg|_1^{-1} = \frac{2}{3} \mu_0 \sigma \omega R \, \hat{e}_z$$