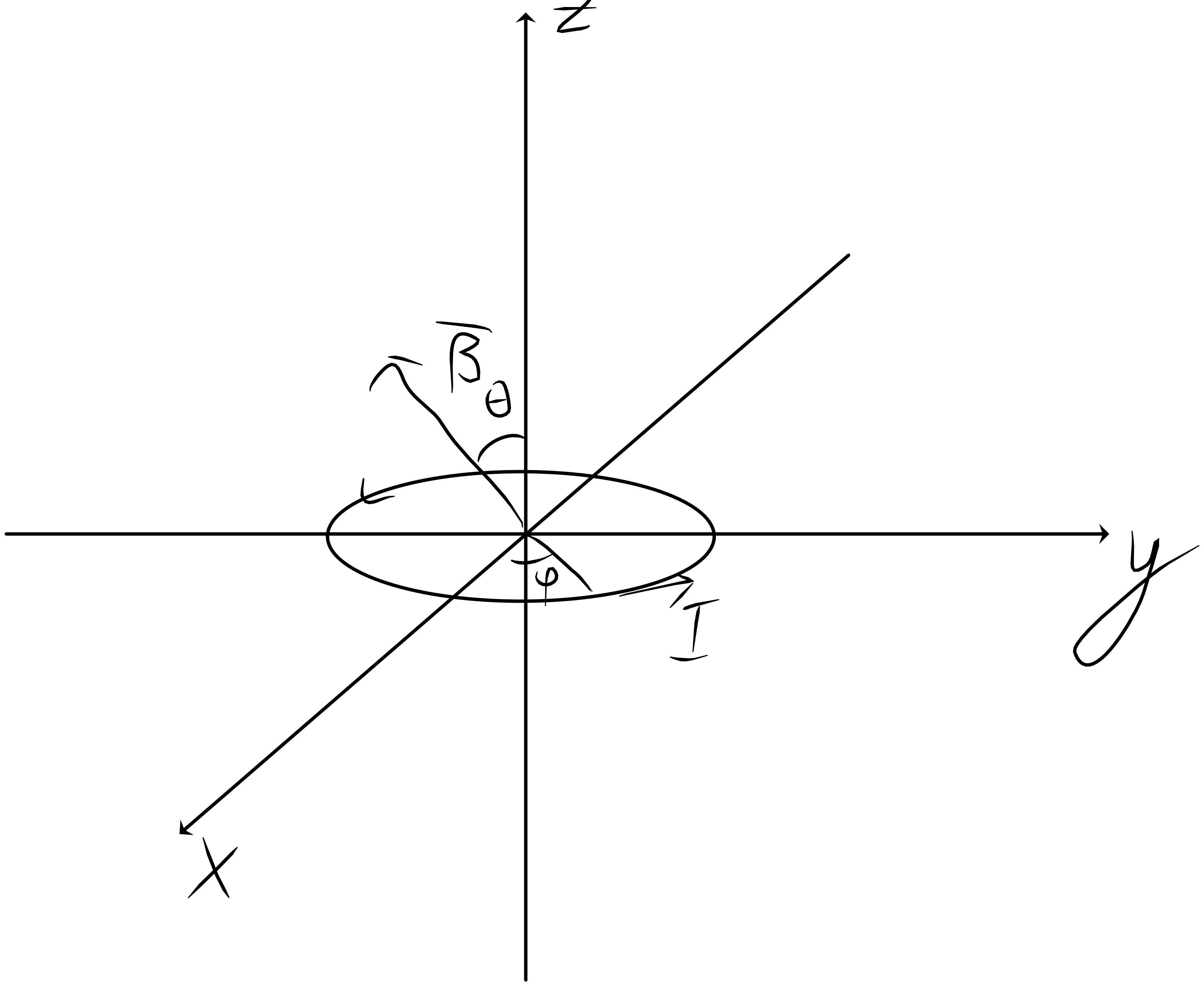

$$d\bar{N} = \bar{r} \times d\bar{F}$$

$$d\bar{F} = d\bar{l} \times \bar{B}$$

$$\bar{B} = B\left[0;\ -\sin\theta;\ \cos\theta\right]$$

$$\bar{l} = R\left[\cos\varphi;\ \sin\varphi,\ 0\right]$$

$$d\bar{l} = R\,d\varphi\left[-\sin\varphi;\ \cos\varphi;\ 0\right]$$

$$\bar{r} = \bar{l}$$

$$\boxed{\bar{A}\times(\bar{B}\times\bar{C}) = \bar{B}(\bar{A}\cdot\bar{C}) - \bar{C}(\bar{A}\cdot\bar{B})}$$

$$d\bar{N} = \bar{r}\times\left(d\bar{l}\times\bar{B}\right) = d\bar{l}\left(\bar{r}\cdot\bar{B}\right) - \bar{B}\left(d\bar{l}\cdot\bar{r}\right) =$$

$$= R^2 B\,d\varphi\left[-\sin\varphi;\ \cos\varphi;\ 0\right]\cdot(-\sin\varphi\sin\theta) - R^2 B\,d\varphi\left[0;\ -\sin\theta;\ \cos\theta\right]\cdot 0$$

$$= -R^2 B\,d\varphi\left[-\sin^2\varphi\sin\theta;\ \sin\varphi\cos\varphi\sin\theta;\ 0\right]$$

$$\bar{N} = -R^2 B\int_0^{2\pi}\left[-\sin^2\varphi\sin\theta;\ \sin\varphi\cos\varphi\sin\theta;\ 0\right]d\varphi = -R^2 B\left[-\pi\sin\theta;\ 0;\ 0\right]$$

$$\bar{N} = R^2 B\,\pi\sin\theta\ \hat{e}_x$$