disk. m. R. σ

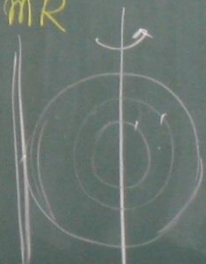
$$\int_{\theta=0}^{2\pi} 1\, d\theta = \theta \Big|_0^{2\pi} = 2\pi$$

$$\int_0^R \underline{\int_{\theta=0}^{2\pi} r^2 \sigma\, r\, \underline{d\theta}\, \underline{dr}} = 2\pi\sigma \int_0^R r^3 dr$$

$$= 2\pi\sigma \frac{r^4}{4}\Big|_0^R = \frac{\pi\sigma R^4}{2}$$

$$= \frac{1}{2} m R^2$$

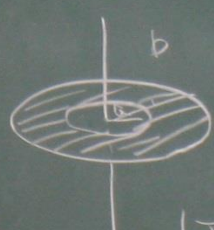
$\frac{3}{2} mR^2$



$m = \sigma \pi R^2$

$\frac{1}{4} mR^2$

m, σ



$$\int_a^b \int_{\theta=0}^{2\pi} r^2 \sigma\, r\, d\theta\, dr = 2\pi\sigma \frac{r^4}{4}\Big|_a^b = \frac{\pi}{2}\sigma (b^4 - a^4)$$

$$m = (\pi b^2 - \pi a^2)\sigma$$

$$= \pi(b^2 - a^2)\sigma$$

$$\frac{1}{2}\pi\sigma (b^2 + a^2)(b^2 - a^2)$$

$$= \frac{1}{2} m (b^2 + a^2)$$

disk. m. R. σ

$$\int_{\theta=0}^{2\pi} 1\, d\theta = \theta \Big|_0^{2\pi} = 2\pi$$

$$\int_0^R \int_{\theta=0}^{2\pi} r^2 \sigma\, r\, d\theta\, dr = 2\pi\sigma \int_0^R r^3\, dr$$

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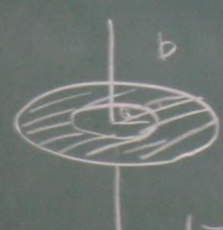
m, σ



$$\int_a^b \int_{\theta=0}^{2\pi} r^2 \sigma\, r\, d\theta\, dr = 2\pi\sigma\, \frac{r^4}{4}\Big|_a^b = \frac{\pi}{2}\sigma\,(b^4 - a^4)$$

$$m = (\pi b^2 - \pi a^2)\,\sigma$$

$$= \pi(b^2 - a^2)\,\sigma$$

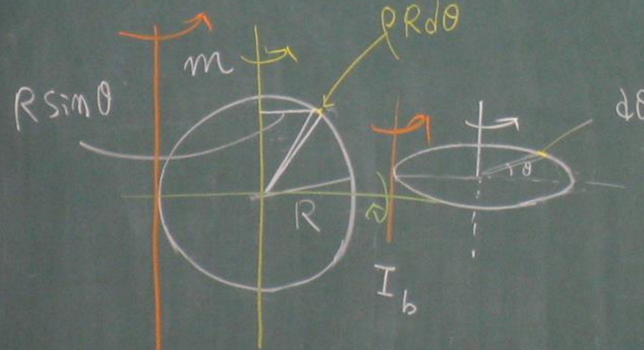
$$\frac{1}{2}\pi\sigma\,(b^2 + a^2)(b^2 - a^2)$$

$$= \frac{1}{2} m\,(b^2 + a^2)$$

$$2 \times \int_{\theta=0}^{\pi} \underbrace{R^2 \sin^2\theta}_{r_i^2} \underbrace{\rho R d\theta}_{dm_i} = 2 \times R^3 \rho \underbrace{\int_{\theta=0}^{\pi} \sin^2\theta \, d\theta}_{\downarrow \ \frac{\pi}{2}} \qquad \frac{1}{2}\int_0^{\pi} \underbrace{(\sin^2\theta + \cos^2\theta)}_{\overset{\parallel}{1}} d\theta$$

$$= \pi R^3 \rho = \frac{1}{2} m R^2$$

$\frac{3}{2} m R^2$



$$I = \sum_i m_i r_i^2 \Rightarrow \int r_i^2 \, dm_i$$

$$\int_{\theta=0}^{2\pi} R^2 \rho R d\theta = \rho R^3 2\pi = m R^2$$

$$I_b = m R^2 + I_c = 2 m R^2$$

disk. m. R. σ

$$\int_{\theta=0}^{2\pi} 1\, d\theta = \theta \Big|_0^{2\pi} = 2\pi$$

$$\int_0^R \int_{\theta=0}^{2\pi} r^2 \sigma\, r\, d\theta\, dr = 2\pi\sigma \int_0^R r^3 dr$$

$\frac{3}{2} mR^2$

$m = \sigma \pi R^2$

$\frac{1}{4} mR^2$

$$= 2\pi\sigma \frac{r^4}{4}\Big|_0^R = \frac{\pi\sigma R^4}{2}$$

$$= \frac{1}{2} mR^2$$

m , σ

$$\int_a^b \int_{\theta=0}^{2\pi} r^2 \sigma\, r\, d\theta\, dr = 2\pi\sigma \frac{r^4}{4}\Big|_a^b = \frac{\pi}{2}\sigma (b^4 - a^4)$$

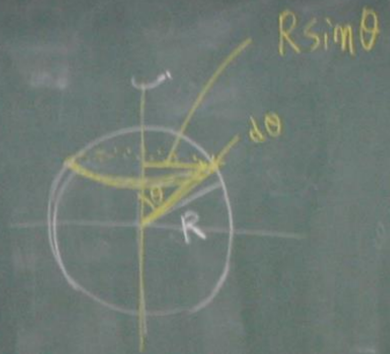
$m = (\pi b^2 - \pi a^2)\sigma$

$= \pi (b^2 - a^2)\sigma$

$$\frac{1}{2}\pi\sigma (b^2 + a^2)(b^2 - a^2)$$

$$= \frac{1}{2} m (b^2 + a^2)$$

R sin



$dm \qquad \sigma\, 2\pi \underline{R\sin\theta}\, d\theta$

$\int r_i^2\, dm_i$

$= \int_{\theta=0}^{\pi} \underline{R^2 \sin^2\theta}\, \sigma\, 2\pi R \sin\theta\, d\theta$

$\sigma\, 2\pi R^3 \int_{\theta=0}^{\pi} \sin^3\theta\, d\theta$

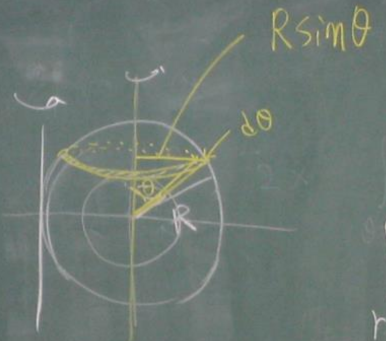
$\frac{d\cos\theta}{d\theta} = -\sin\theta$

$\frac{d\sin\theta}{d\theta} = \cos\theta$

$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$\sin^2\alpha + \cos^2\alpha = 1$



$dm \quad \sigma\, 2\pi \underline{R \sin\theta}\, R\, d\theta$

$\int r_i^2\, dm_i$

$$\int_{r=0}^{R} \rho\, 2\pi r^4\, \frac{4}{3}\, dr$$

$$\int_{r=0}^{R} \int_{\theta=0}^{\pi} r^4 \sin^2\theta\, \underline{2\pi}\, \underline{\sin\theta}\, \underline{d\theta}\, dr$$

$$\rho\, 2\pi \left(\frac{4}{3}\right) \frac{R^5}{5}$$

$$\underline{\frac{2}{5} m R^2}$$

$$\sigma\, 2\pi R^4 \int_{\theta=0}^{\pi} \sin^2\theta\, (-d\cos\theta)$$

$$(1-\cos^2\theta)$$

$$= 2\pi\sigma R^4 \int_{\theta=0}^{\pi} (\underbrace{\cos^2\theta}_{x^2} - 1)(\underbrace{d\cos\theta}_{dx})$$

$$\left.\frac{\cos^3\theta}{3}\right|_{\theta=0}^{\pi} - \left.\cos\theta\right|_{\theta=0}^{\pi}$$

$$\frac{(-1-1)}{3} - (-1-1)$$

$$= \frac{-2}{3} + 2 = \frac{4}{3}$$

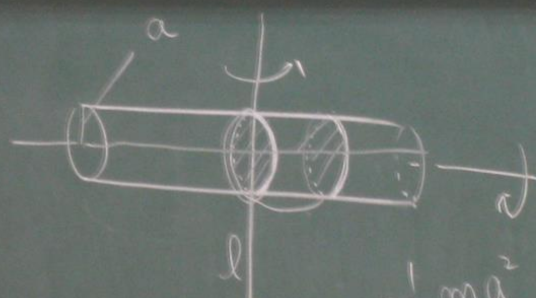
$$I = \int_{y=-\frac{a}{2}}^{\frac{a}{2}} \int_{x=-\frac{b}{2}}^{\frac{b}{2}} \underline{(x^2+y^2)\,\sigma\,dx\,dy} = \frac{1}{12} m (a^2+b^2)$$

$$\sigma a \int_{-\frac{b}{2}}^{\frac{b}{2}} x^2 dx \rightarrow \left.\frac{x^3}{3}\right|_{-\frac{b}{2}}^{\frac{b}{2}}$$

$$\underline{\sigma a \frac{b^3}{12}}$$

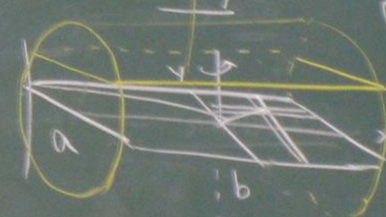
$$\int_{y=-\frac{a}{2}}^{\frac{a}{2}} \int_{x=-\frac{b}{2}}^{\frac{b}{2}} x^2 \sigma\,dx\,dy + \iint y^2 \sigma\,dx\,dy$$

$$\sigma ab \frac{a^2+b^2}{12} \qquad \underline{\sigma b \frac{a^3}{12}}$$



$$\frac{1}{4} m a^2$$

$$\underline{x^2+y^2}$$



$$\sigma\,dx\,dy$$