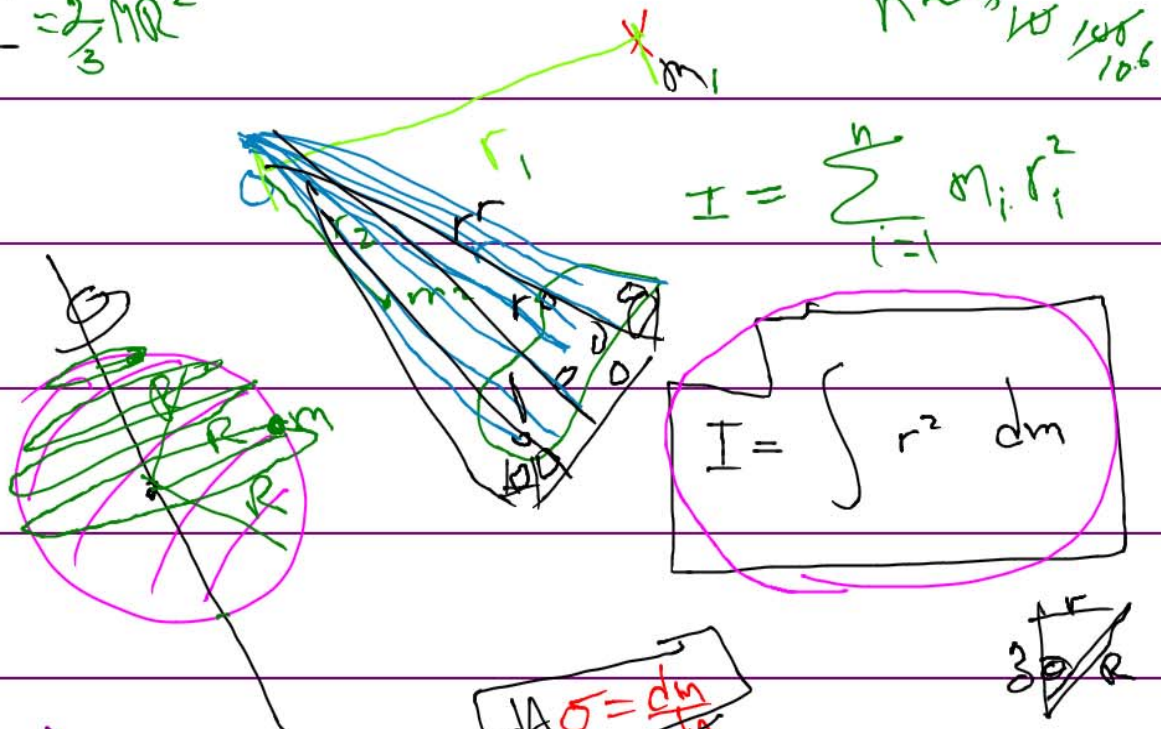
$$I = mr^2$$

$$I = m_1 r_1^2 + m_2 r_2^2$$

$$I = \frac{2}{3} MR^2$$



$$n \sim 10^{23}$$

$$I = \sum_{i=1}^{n} m_i r_i^2$$

$$I = \int r^2 \, dm$$

$$dA\,\sigma = \frac{dm}{dA}$$

$$dA = \frac{R d\theta * R \sin\theta \, d\phi}{r d\phi} \qquad \sigma = \frac{M}{4\pi R^2}$$

$$\frac{ds}{R} = d\theta R \qquad I = \sigma \int r^2 \, dA$$

$$r = R\sin\theta$$

$$\sigma = \frac{dm}{dA}$$

$$I = R^4 \sigma \int_{\theta=0}^{\pi} \int_{\phi=}^{2\pi} R^2 \sin^3\theta R^2 \sin\theta \, d\theta d\phi$$

$$d\theta \sin^3\theta = \sin\theta \underbrace{\sin^2\theta}_{(1-\cos^2\theta)} d\theta$$

$$-d\cos\theta$$

$$= 2\pi R^4 \sigma \int_{\theta=0}^{\pi} \sin^3\theta \, d\theta$$

$$= -\int_{1}^{-1} (1-\cos^2\theta) \, d\cos\theta$$

$$I = \frac{2\pi R^4 M}{4\pi R^2} \frac{4}{3}$$

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

$I = 2/3$ ✓

$$\int_{-1}^{1} (1 - \cos\theta)\, d\cos\theta$$

$$2 - x^3/3 \Big|_{-1}^{1}$$

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