

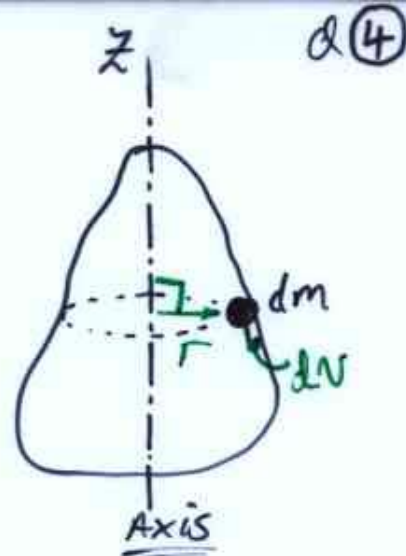
OFTEN DENSITY (ρ) IS CONSTANT.

$$dm = \rho dv \quad (dv \text{ is VOLUME of } dm)$$

$$I = \int r^2 dm = \int r^2 \rho dv$$

$\rho \text{ const}$

$$\Rightarrow I = \rho \int r^2 dv$$



How to evaluate $\int r^2 dv$?

Depends on geometry ... some examples



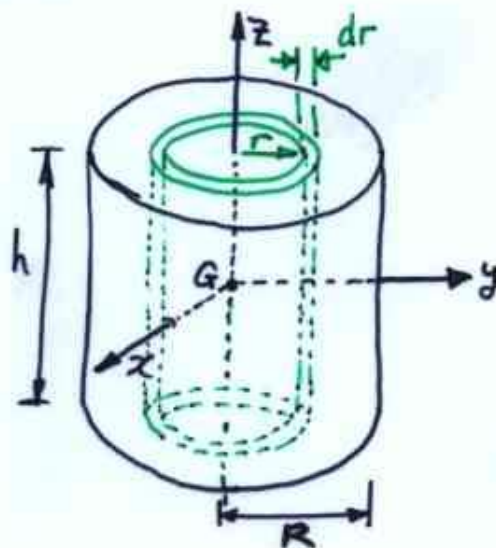
SOLID CYLINDER: radius R , height h
density ρ

CONSIDER ELEMENTAL SHELL
radius r

Wall thickness dr

$$\Rightarrow \text{VOL} = (2\pi r)(dr)(h) = dv$$

$$\begin{aligned} I_G &= \rho \int r^2 dv \\ &= \rho \int_0^R 2\pi h r^3 dr \\ &= \rho \frac{\pi}{2} R^4 h \end{aligned}$$



NOTE $\text{VOL} = \pi R^2 h$

$$\therefore I_G = \frac{m R^2}{2}$$