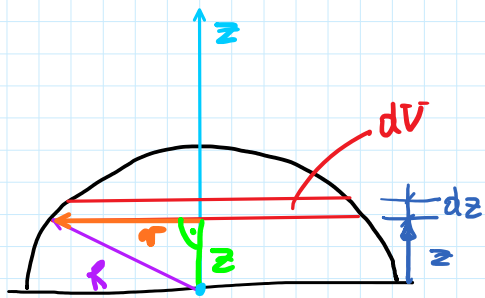
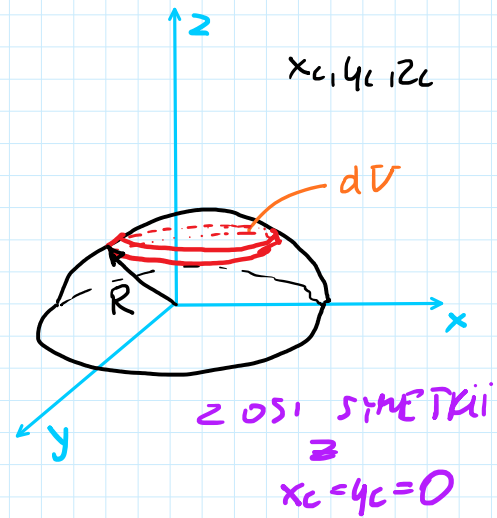
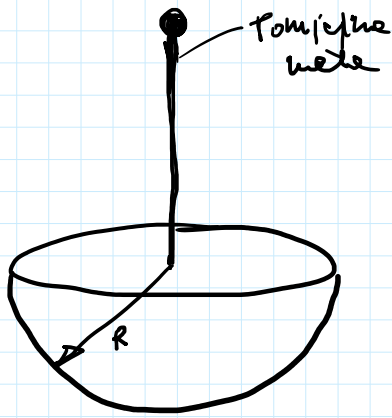
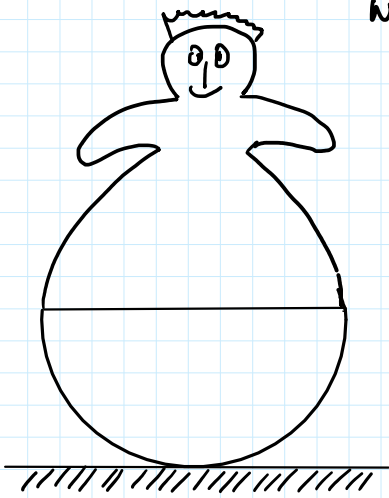


WANKA WSTAWKA



$$dV = \pi r^2 \cdot dz = \pi(R^2 - z^2) dz$$

$$R^2 = r^2 + z^2$$

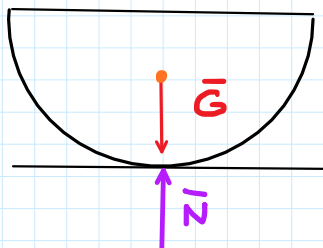
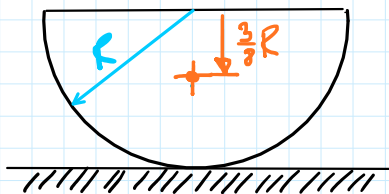
$$r^2 = R^2 - z^2$$

$$z_c = \frac{S_{xy}}{V} = \frac{\int_V z \, dV}{\int_V dV} = \frac{\int_0^R z \pi(R^2 - z^2) \, dz}{\int_0^R \pi(R^2 - z^2) \, dz}$$

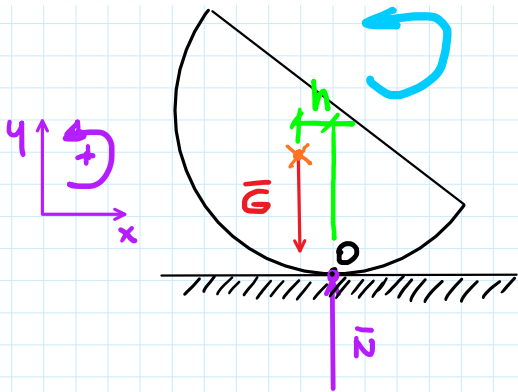
$$= \frac{\int_0^R (\pi R^2 z - \pi R^2 z^3) \, dz}{\int_0^R (\pi R^2 - \pi z^2) \, dz} = \frac{\pi R^2 \frac{z^2}{2} \Big|_0^R - \pi R^2 \frac{z^4}{4} \Big|_0^R}{\pi R^2 z \Big|_0^R - \pi \frac{z^3}{3} \Big|_0^R}$$

$$= \frac{\frac{\pi R^4}{2} - \frac{\pi R^4}{4}}{\pi R^3 - \frac{\pi R^3}{3}} = \frac{\frac{\pi R^4}{4}}{\frac{2}{3} \pi R^3} = R \frac{3}{8}$$

Objętość  $\frac{1}{2}$  kuli



Wektory sił  
wspierającej i ciężkości:  
 $\vec{G} - \vec{N} = 0 \Rightarrow \vec{G} = \vec{N}$



WARUNKI RÓWNOWAŻY:

$$\begin{cases} \sum F_{iy} = 0 \\ \sum \tau_{i0} = 0 \end{cases}$$

$$\begin{aligned} -G + N &= 0 \Rightarrow G = N \\ G \cdot h + N \cdot 0 &= 0 \quad \underline{G \cdot h} \neq 0 \end{aligned}$$

NIE SA SPETNIONE

