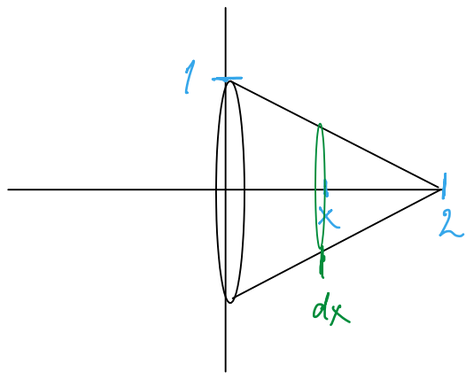
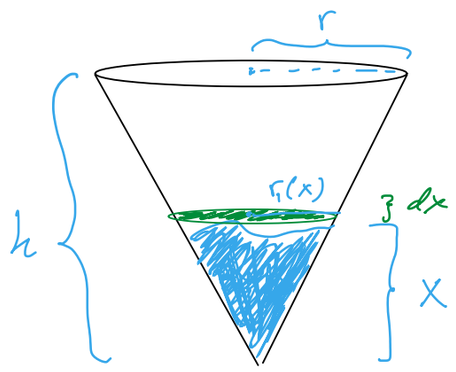
14.14

torsdag 22 december 2022 21:23

$h = 2m \quad r = 1m \quad \rho(x) = (10 - x^2)\ kg/m^3$





$$\frac{r_1(x)}{r} = \frac{x}{h}$$

$$\boxed{r_1(x) = \frac{r}{h}x = \frac{1}{2}x}$$

$$m = \int_k dm = \int_0^2 \rho(x)\,dV = \int_0^2 \rho(x) \cdot \pi \cdot f(x)^2\,dx =$$

↖ skivformeln

$$= \int_0^2 (10 - x^2)\,\pi \cdot \left(\frac{1}{2}x\right)^2 dx = \frac{\pi}{4}\int_0^2 10x^2 - x^4\,dx =$$

$$= \frac{\pi}{4}\left[10 \cdot \frac{x^3}{3} - \frac{x^5}{5}\right]_0^2 = \frac{\pi}{4}\left(10\,\frac{8}{3} - \frac{32}{5}\right) = \frac{\pi}{4}\left(\frac{2 \cdot 5 \cdot 4 \cdot 2 \cdot 5 - 4 \cdot 8 \cdot 3}{3 \cdot 5}\right) =$$

$$= \pi\,\frac{76}{15}\ kg$$