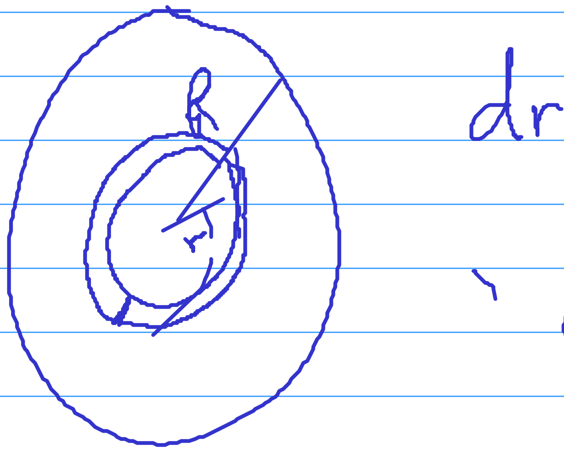
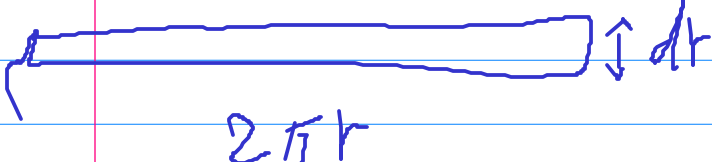
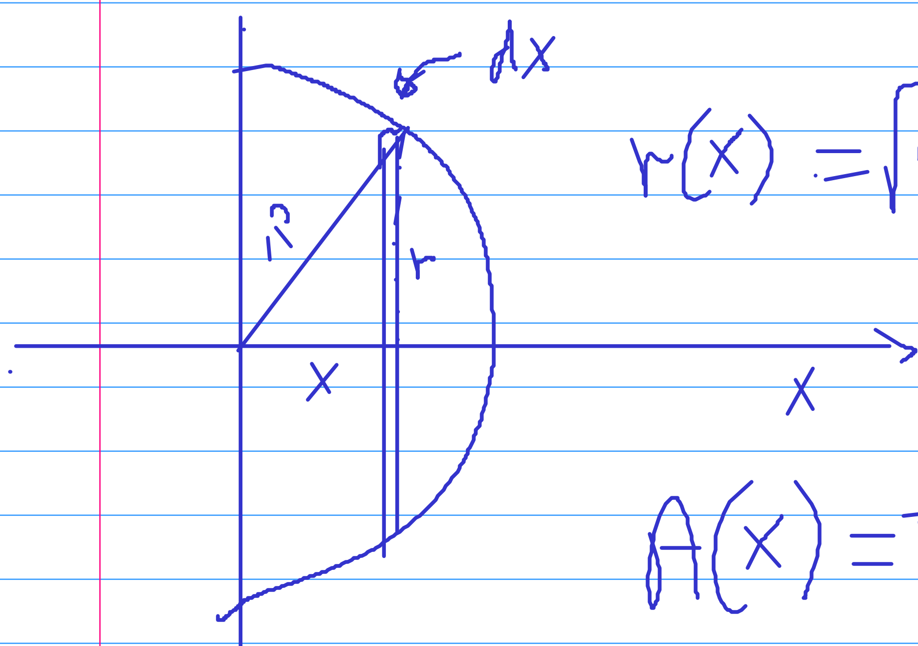


$$dA = 2\pi r\,dr$$



$$A = \int_0^R 2\pi r\,dr = \pi R^2$$



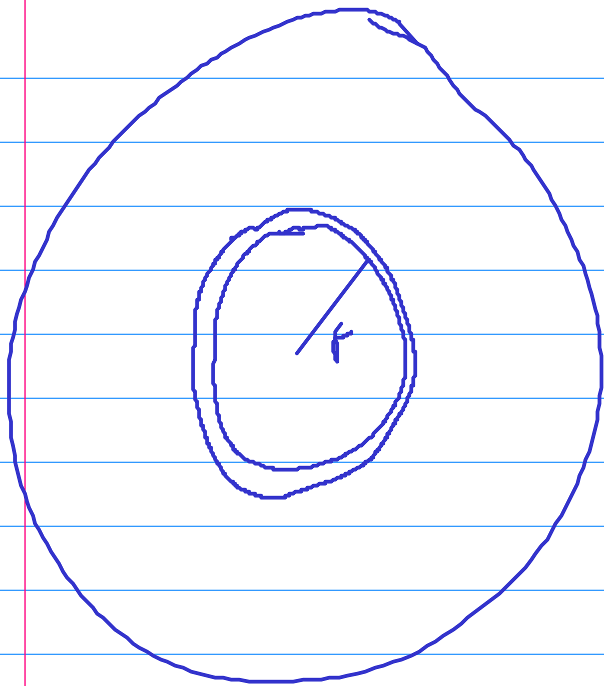
$$r(x) = \sqrt{R^2 - x^2}$$

$$A(x) = \pi r^2(x) = \pi(R^2 - x^2)$$

$$dV = \pi(R^2 - x^2)\,dx$$

$$V_{1/2} = \int_0^R dV = \int_0^R$$

$$\Rightarrow V = \frac{4}{3}\pi R^3$$



$$A(r) \cdot dr = dV$$

$$A(r) = \frac{dV}{dr}$$

$$= \frac{d}{dr} \frac{4}{3} \pi r^3$$

$$= 4 \pi r^2$$

$$\Delta E_p \Big|_{r_1}^{r_2} = -L \Big|_{r_1}^{r_2}$$

$$F \propto \frac{1}{r^2}$$

$$E_p(\infty) = 0$$

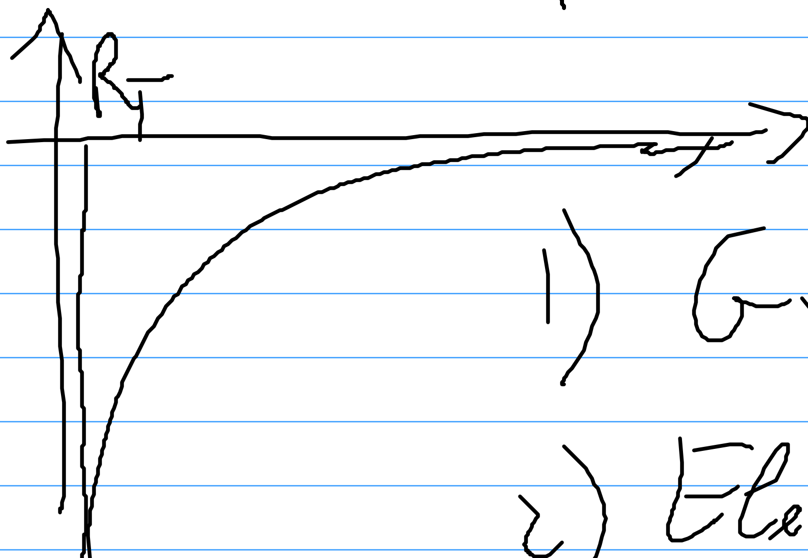
$$E_p(r_2) = E_p(r_1) + \Delta E_p \Big|_{r_1}^{r_2}$$

$$E_p(r) = E_p(\infty) + \Delta E_p \Big|_{\infty}^{r}$$

$$= \underbrace{E_p(\infty)}_{=0} - L \Big|_{\infty}^{r}$$

$$E_p(r) = L_r^{\infty} = \int_r^{\infty} \left(-\frac{GMm}{r^2}\right) dr$$

$$E_p = -\frac{GMm}{r}$$



1) Gravità

2) Elettr. $Q \cdot q < 0$

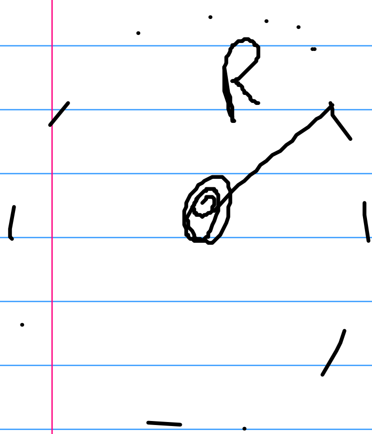
$$F(r) = -\frac{d}{dr} E_p(r)$$

$$E(R_T + h) = -\frac{GMm}{R_T + h} = -\frac{GMm}{R_T\left(1 + \frac{h}{R_T}\right)}$$

$$\simeq -\frac{GMm}{R_T}\left(1 - h/R_T\right)$$

$$\simeq -\frac{GMm}{R_T} + \frac{GMm}{R_T^2} \cdot h$$

$$= \underbrace{E_p(R_T)}_{=0} + \underline{mgh} \quad ?$$



$$E_p(R) = \ldots$$

$$E_c(R) \ldots$$

$$\Rightarrow E(R)$$