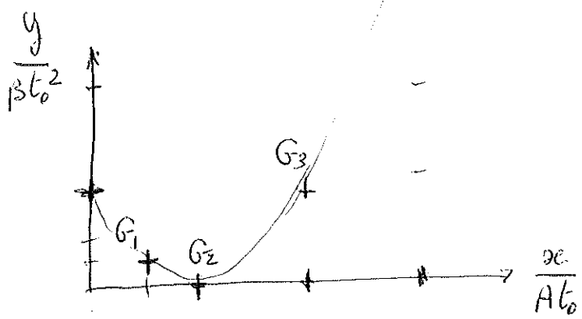
Méca Avril 2021

1) 11) $G_1\left(\frac{t_0}{2}\right) = \begin{vmatrix} \frac{At_0}{2} \\ B\frac{t_0^2}{4} \end{vmatrix}$ $G_2(t_0) = \begin{vmatrix} At_0 \\ 0 \end{vmatrix}$

$G_3(2t_0) = \begin{vmatrix} 2At_0 \\ Bt_0^2 \end{vmatrix}$



12) $t = \frac{x}{A} \rightarrow y = B\left(\frac{x}{a} - t_0\right)^2$

$= B\frac{x^2}{A^2} - \frac{2Bt_0x}{A} + Bt_0^2$

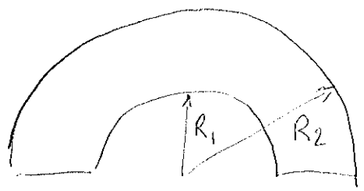
$y = Bt_0^2\left(\frac{x}{At_0} - 1\right)^2$

$\rightarrow \boxed{\frac{y}{Bt_0^2} = \left(\frac{x}{At_0} - 1\right)^2}$

13) $\vec{v} = \begin{vmatrix} A \\ 2B(t-t_0) \end{vmatrix}$ $\vec{a} = \begin{vmatrix} 0 \\ 2B \end{vmatrix}$ parabole

uniforme le long de x, uniformément accéléré le long de y

2) 21) Voir TDs $\quad y_G = \frac{4R}{3\pi}$



$m\,\overrightarrow{OG} = \sigma \int y\,dm$

$y = r\sin\theta$

$dm = \sigma\,dS$

$= \sigma\, r\,dr\,d\theta$

$$m\,y_G = \sigma \int_{R_1}^{R_2} y\,dS = \sigma \int_{R_1}^{R_2} r^2\,dr \int_0^{\pi} \sin\theta\,d\theta$$

$$= \sigma \left(\frac{R_2^3 - R_1^3}{3}\right) 2$$

$$m = \sigma\,\frac{\pi}{2}\left(R_2^2 - R_1^2\right)$$

$$y_G = \frac{4}{3\pi}\left(\frac{R_2^3 - R_1^3}{R_2^2 - R_1^2}\right)$$

Guldin : $\quad \frac{4}{3}\pi\left(R_2^3 - R_1^3\right) = 2\pi \cdot \frac{\pi}{2}\left(R_2^2 - R_1^2\right) \cdot y_G$

$$\rightarrow \quad y_G = \frac{4}{3\pi}\left(\frac{R_2^3 - R_1^3}{R_2^2 - R_1^2}\right)$$