**Ex. 2 : Fig. 2 (a).**

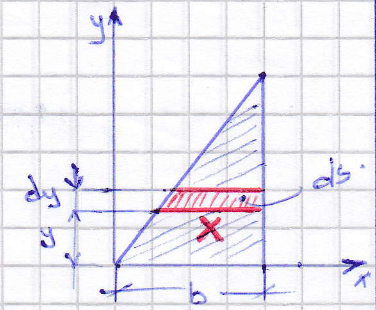
Cas surfacique plan :

$z_G = 0$

$$x_G = \frac{\int x\,ds}{\int ds} \quad \text{et} \quad y_G = \frac{\int y\,ds}{\int ds}$$

$y_G = ?$

$$y_G = \frac{\int y\,ds}{\int ds}$$




$ds = x \cdot dy$

$\frac{b}{h} = \frac{x}{h-y}$ (Théorème de Thalès)

$x = b\,\frac{h-y}{h}$ $\qquad 0 \leq y \leq h$

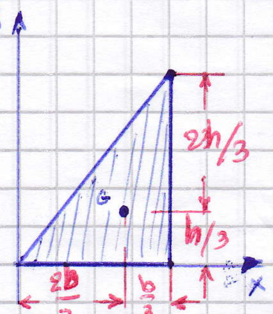
$$S = \int ds = \int_0^h \frac{b}{h}\,\frac{h-y}{h}\cdot dy = \frac{bh}{2}$$

$$\int y\,ds = \int_0 b\,y \cdot \frac{h-y}{h}\,dy = \frac{bh^2}{6}$$

$$\Rightarrow \quad y_G = \frac{bh}{3}$$

Même raisonnement pour $x_G$ : on trouve

$x_G = \frac{2b}{3}$




**Ex. 2 : Fig. 2 (b)** demi-cercle. (cerceau)

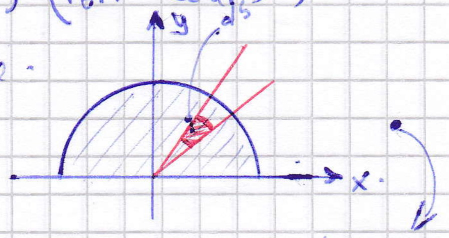
$\hat{m}$ chose que pour Ex. 1 (a). et l'on trouve.

$x_G = 0$ (symétrie / Oy)

$y_G = \frac{2R}{\pi}$

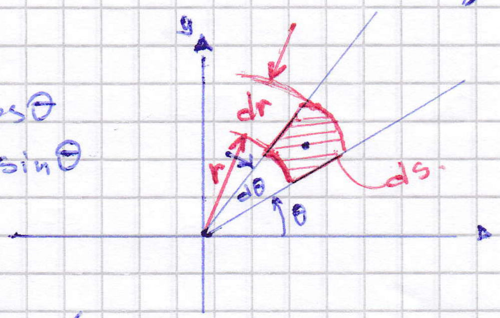
**Ex. 2 (c)** (Voir Cours)

demi-disque de rayon R.




$x = r\cos\theta$

$y = yr\sin\theta$




symétrie / Oy $\Rightarrow x_G = 0$.

$$y_G = \frac{\int y\,ds}{\int ds}$$

$dS = r\,d\theta \cdot dr \longrightarrow$ $0 \leq r \leq R$, $0 \leq \theta \leq \pi$.

$$S = \int ds = \int_0^R\int_0^\pi r\,dr\,d\theta = \int_0^R r\,dr \cdot \int_0^\pi d\theta$$

$$S = \frac{r^2}{2}\Big|_0^R \cdot \theta\Big|_0^\pi = \frac{\pi R^2}{2} \quad \text{(cqfd).}$$

$$\int y\,ds = \int_0^R\int_0^\pi r^2\sin\theta\,dr\,d\theta$$

$$= \int_0^R r^2\,dr \cdot \int_0^\pi \sin\theta\,d\theta = \frac{2}{3}R^3$$

$$y_G = \frac{4R}{3\pi}$$

Rque : Considérer $\frac{1}{4}$ de disque on trouve

$x_G = \frac{4R}{3\pi}$ ; $y_G = \frac{4R}{3\pi}$