P1)

a) $\int (4x^5 - 2x^{2/3} + 10)\, dx$

$= 4\int x^5 dx - 2\int x^{2/3} dx + 10\int dx$

$= 4 \cdot \frac{x^6}{6} - 2 \cdot \frac{3}{5} x^{5/3} + 10x + C$

b) $\int_{-\frac{\pi}{2}}^{\pi/2} \frac{1}{y^{1/2}} \left( y x^2 + y^3 \cos(x) \right) dx$

$= \frac{1}{y^{1/2}} \int_{-\frac{\pi}{2}}^{\pi/2} y x^2 + y^3 \cos(x)\, dx$

$= \frac{1}{y^{1/2}} \left( y \int_{-\frac{\pi}{2}}^{\pi/2} x^2\, dx + y^3 \int_{-\frac{\pi}{2}}^{\pi/2} \cos(x)\, dx \right)$

$= \frac{1}{y^{1/2}} \left( y \left. \frac{x^3}{3} \right|_{-\frac{\pi}{2}}^{\pi/2} + y^3 \left. \mathrm{sen}(x) \right|_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \right)$

$= \frac{1}{y^{1/2}} \left( y \left[ \frac{(\frac{\pi}{2})^3}{3} + \frac{(\frac{\pi}{2})^3}{3} \right] + y^3 \left[ \mathrm{sen}(\tfrac{\pi}{2}) - \mathrm{sen}(-\tfrac{\pi}{2}) \right] \right)$

$= \frac{1}{y^{1/2}} \left( y \cdot \frac{\pi^3}{24} + 2y^3 \right)$

P2/ $f(x) = \frac{2}{\sqrt{1-x^2}}$

$$F(x) = \int \frac{2}{\sqrt{1-x^2}}\,dx = 2\int \frac{1}{\sqrt{1-x^2}}\,dx$$

$= 2\arcsen(x) + C$

condición, $F(1) = 2\pi$

$\Rightarrow 2\pi = 2\arcsen(1) + C$

$\Rightarrow 2\pi = \cancel{2}\cdot\frac{\pi}{\cancel{2}} + C \Rightarrow 2\pi = \pi + C \Rightarrow \boxed{C = \pi}$

$\therefore \boxed{F(x) = 2\arcsen(x) + \pi}$

P3/ $a(t) = 2\operatorname{sen}(t) \rightarrow V(t) = \int 2\operatorname{sen}(t)\,dt$

$= 2\int \operatorname{sen}(t)\,dt = -2\cos(t) + C$ | condición $V(0) = 0$

$\Rightarrow 0 = -2\cos(0) + C \Rightarrow 0 = -2 + C \Rightarrow \boxed{C = 2}$

$\therefore V(t) = -2\cos(t) + 2$

luego: $x(t) = \int v(t)\,dt \Rightarrow \int -2\cos(t) + 2\,dt$

$= -2\int \cos(t)\,dt + 2\int dt$

$= -2\,\text{sen}(t) + 2t + C$ | condición, $x(0) = 0$

$\Rightarrow 0 = -2\,\text{sen}(0) + 2\cdot 0 + C \Rightarrow \boxed{C = 0}$

$\therefore \boxed{x(t) = -2\,\text{sen}(t) + 2t}$

Pu/ observación: $y = -x^2 - 2x + 3 = -(x^2 + 2x - 3)$

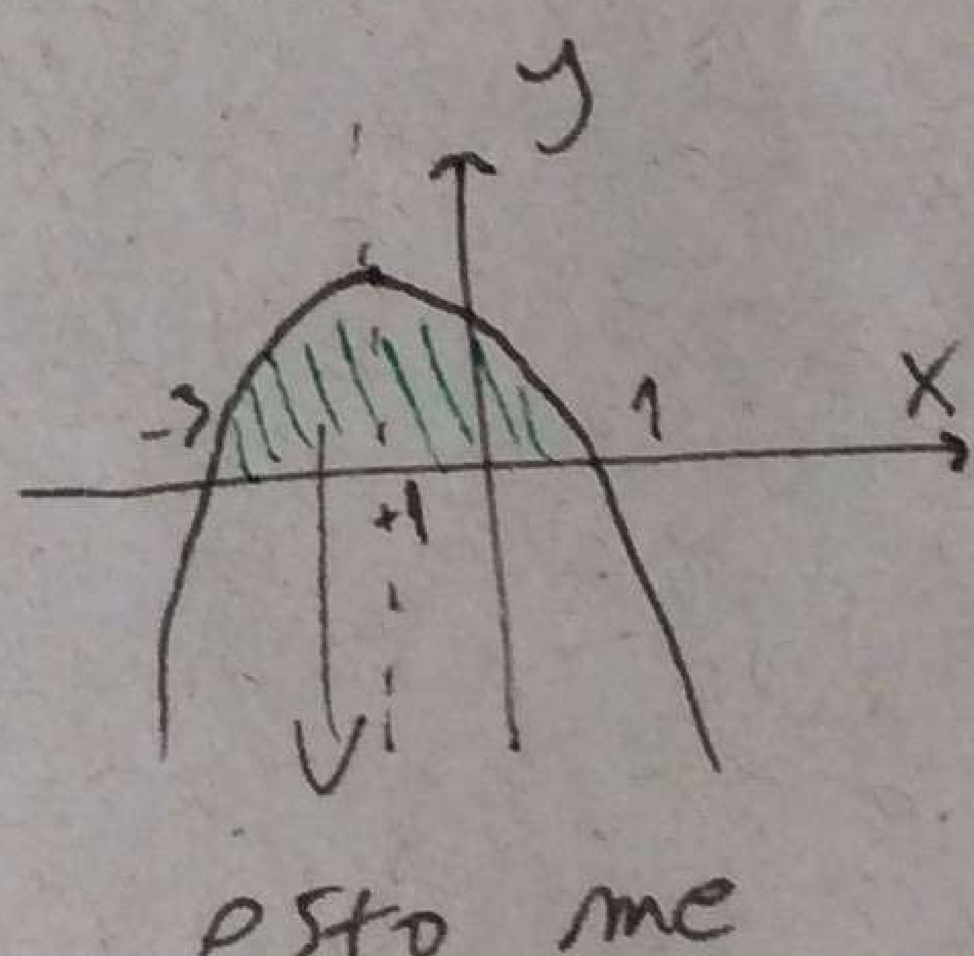
$= -(x^2 + 2x + 1 - 4) = -((x+1)^2 - 4)$

$= \boxed{-(x+1)^2 + 4} \longrightarrow$ forma canónica!

busquemos cuándo esto es 0:

$-(x+1)^2 + 4 = 0 \Rightarrow (x+1)^2 = 4 \Rightarrow x+1 = \pm 2$

$\Rightarrow x = -1 \pm 2$ $\rightarrow x_1 = 1$, $\rightarrow x_2 = -3$




esto me piden!

$$A = \int_{-3}^{1} -x^2 - 2x + 3 \, dx = -\int_{-3}^{1} x^2 \, dx - 2\int_{-3}^{1} x \, dx + 3\int_{-3}^{1} dx$$

$$= -\frac{x^3}{3}\Big|_{-3}^{1} - 2\,\frac{x^2}{2}\Big|_{-3}^{1} + 3\,x\Big|_{-3}^{1}$$

$$= -\left(\frac{1}{3} + \frac{9}{3}\right) - 2\left(\frac{1}{2} - \frac{9}{2}\right) + 3(1+3)$$

$$= -\frac{10}{3} + \cancel{2}\cdot\frac{8}{\cancel{2}} + 12 = 20 - \frac{10}{3} \;//$$

P5) $\text{Area}(a) = \displaystyle\int_{-a}^{a} \frac{1}{1+x^2} \, dx = \operatorname{arctg}(x)\Big|_{-a}^{a}$

$$= \operatorname{arctg}(a) - \operatorname{arctg}(-a) = 2\operatorname{arctg}(a)$$

tomemos el límite:

$$\lim_{a\to\infty} 2\operatorname{arctg}(a) = 2 \lim_{a\to\infty} \operatorname{arctg}(a) = 2 \cdot \frac{\pi}{2} = \pi$$

$\therefore$ el área nunca será mayor a $\pi$.