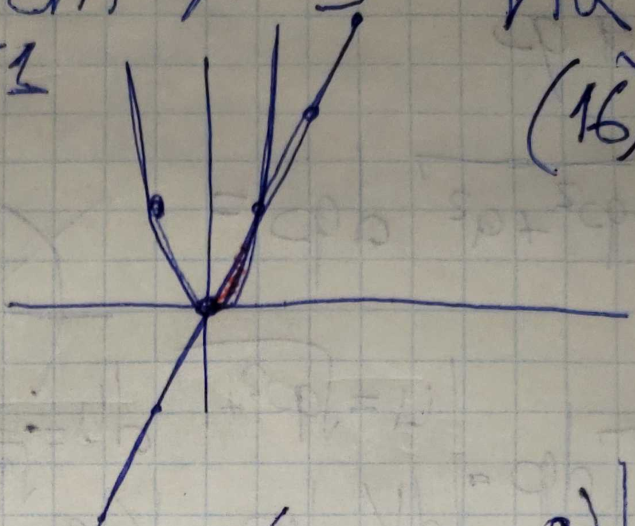
Билет № 3 ИиДУ РК1

(16) (29)

№ 1

$$\begin{cases} y = 2x^2 \\ y = 2x \end{cases}$$

$x = 0; 1$



$$S = \int_0^1 (2x - 2x^2)\,dx = \left(x^2 - \frac{2x^3}{3}\right)\Bigg|_0^1 =$$

$$= 1 - \frac{2}{3} = \frac{1}{3}$$

+

№ 2

$y_1 = \pm\sqrt{2x}$

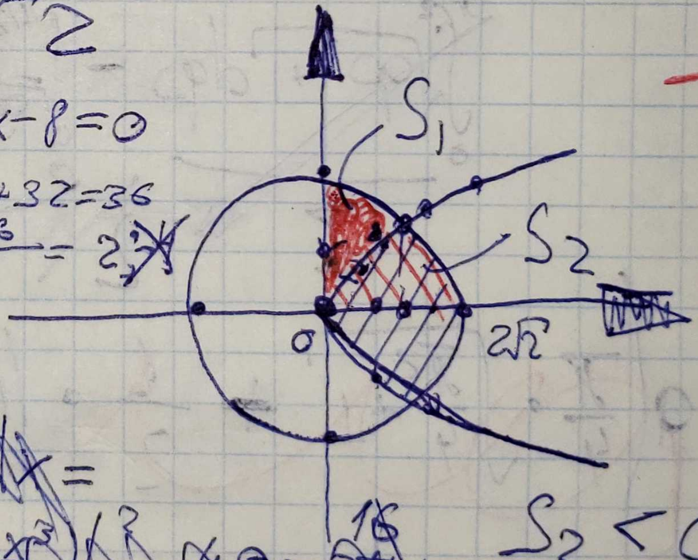
$x^2 + y^2 = 8$

$y_2 = \pm\sqrt{8 - x^2}$

$x^2 + 2x - 8 = 0$

$D = 4 + 32 = 36$

$x = \frac{-2 \pm 6}{2} = 2; \cancel{-4}$



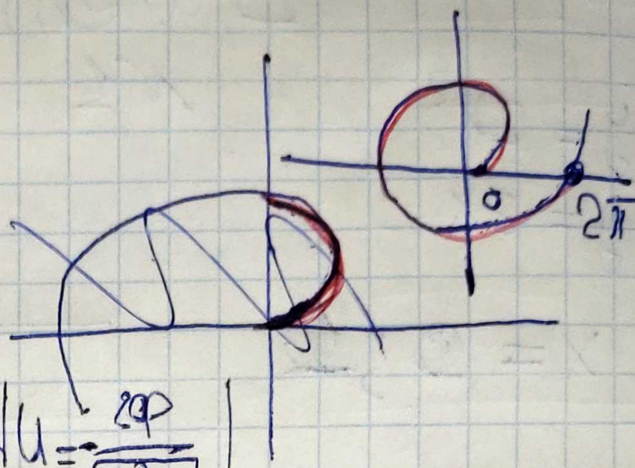
$S_2 < 0$??

$S_1 = \int_0^2 (8 - x^2 - 2x)\,dx = 16 - 4 - \frac{8}{3} = \boxed{\frac{28}{3}}$

№3

$\rho = a\varphi$

$l = \int_0^{\cancel{\pi/2}\ 2\pi} \sqrt{a^2\cdot\varphi^2 + a^2}\, d\varphi =$



$= a\int_0^{2\pi} \underbrace{\sqrt{\varphi^2+1}\,d\varphi}_{I} = \left| \begin{matrix} u=\sqrt{\varphi^2+1} & du = \frac{2\varphi}{\sqrt{\varphi^2+1}} \\ dV = d\varphi & V=\varphi \end{matrix}\right| =$

$= \frac{\varphi\sqrt{\varphi^2+1}}{2}\Big|_0^{2\pi} - \int_0^{2\pi} \frac{\varphi^2+1-1}{\sqrt{\varphi^2+1}} =$

$\underbrace{\int_0^{\pi/2}\sqrt{\varphi^2+1}\,d\varphi}_{I} - \underbrace{\int_0^{\pi/2}\frac{1}{\sqrt{\varphi^2+1}}}_{I} = \ln\left|\varphi+\sqrt{\varphi^2+1}\right|$

2

$= a\left(\frac{\pi}{4}\cdot\sqrt{\frac{\pi^2}{4}+1} + \frac{1}{2}\cdot\ln\left|\frac{\pi}{2}+\sqrt{\frac{\pi^2}{4}+1}\right|\right)$

$= a\left(\pi\cdot\sqrt{4\pi^2+1} + \frac{1}{2}\ln\left|2\pi+\sqrt{4\pi^2+1}\right|\right)$

№ 4

I род

$$\int_{0}^{+\infty} \frac{\sqrt{\operatorname{arctg} x}}{4+x^2}\,dx$$

$$\frac{|\sqrt{\operatorname{arctg} x}|}{4+x^2} \leq \frac{\sqrt{x}}{x^2} < \frac{1}{x^{3/2}}$$

$$\int_{1}^{+\infty} \frac{1}{x^{3/2}}\,dx \; \exists \Rightarrow q = \frac{3}{2}, \; q > 1$$

сход, исход сход

№ 5

II род

$$\int_{0}^{1} \frac{\sqrt{\operatorname{tg} x}}{\ln(1+x^2)}$$

$x \to 0$

$$\left|\frac{\sqrt{\operatorname{tg} x}}{\ln(1+x^2)}\right| \leq \frac{\sqrt{x}}{x^2} \leq \frac{1}{x^{3/2}}$$

$q = 3/2, \; q > 1$

расход,

исход расход