

# УЧДЮ РК БИЛЕТ №1 (18.02.27)

$$y = e^{2x}$$

$$y = e^x + 2$$

$$e^x + 2 = e^{2x}$$

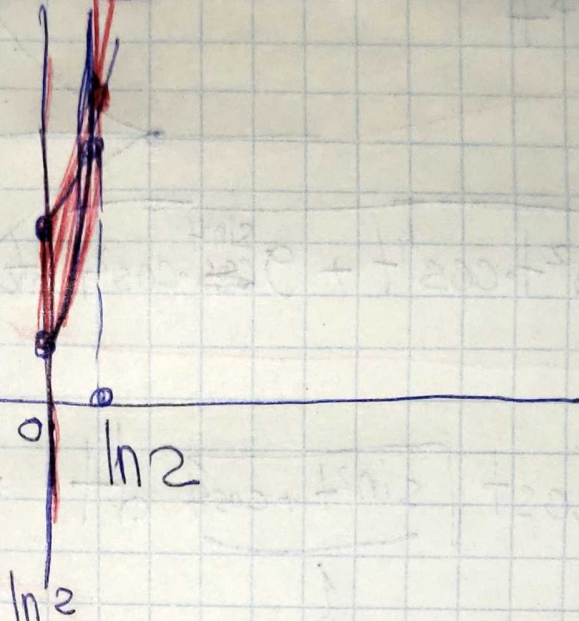
$$z^2 - z - 2 = 0$$

$$D = 1 + 8 = 9$$

$$z = \frac{1 \pm 3}{2} = 2, -1$$

$$\ln 2$$

№1



$$S = \int_0^{\ln 2} (e^x + 2 - e^{2x}) dx = \left( e^x + 2x - \frac{e^{2x}}{2} \right) \Big|_0^{\ln 2} =$$

$$= \cancel{2} + 2\ln 2 - \cancel{2} - 1 + \frac{1}{2} = 2\ln 2 - \frac{1}{2}$$

№2

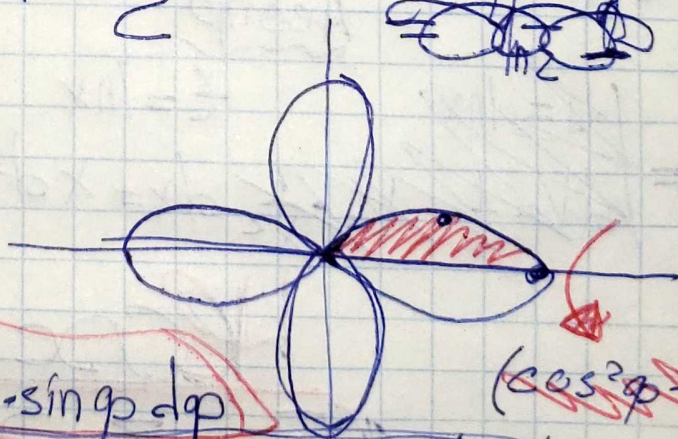
$$\rho = \cos 2\varphi$$

$$0 \rightarrow \frac{\pi}{4}$$

$$V = \frac{2}{3} \pi \int_0^{\pi/4} \cos^3 2\varphi \cdot \sin 2\varphi d\varphi$$

$$= \frac{2}{3} \pi \int_0^{\pi/4} (\cos^2 2\varphi - \sin^2 2\varphi) \sin 2\varphi d\varphi$$

$$= \frac{2}{3} \pi \left[ \frac{\cos^3 2\varphi}{3} - \frac{\sin^3 2\varphi}{3} \right]_0^{\pi/4}$$



$$(\cos^3 2\varphi - \sin^3 2\varphi) \left( \cos 2\varphi - 2\cos^3 2\varphi + \sin^3 2\varphi \right)$$

$$\text{Ans: } \frac{(18\sqrt{2} - 16)\pi}{105}$$

Gumerni Aerni



$$\begin{cases} x = \cos^3 t \\ y = \sin^3 t \end{cases}$$

$$N3 \quad L = 4 \cdot L_{1/4}$$

t	0	$\pi/2$
x	1	0
y	0	1

$$L_{1/4} = \int_{\pi/2}^0 \sqrt{9 \sin^2 t \cos^4 t + 9 \sin^4 t \cos^2 t} dt$$

$$= 3 \int_{\pi/2}^0 \sin t \cos t \sqrt{\sin^2 t + \cos^2 t} dt = \frac{3 \sin^2 t}{2} \Big|_{\pi/2}^0 = -\frac{3}{2}$$

$$L = 4 \cdot \frac{3}{2} = 6$$

$$\int_1^{+\infty} \frac{\ln x}{x} dx$$

$$\int_1^{+\infty} \frac{\ln x}{x} dx = \int_1^{+\infty} \frac{1}{x^2} dx = x dt \Big|_1^{+\infty} = \frac{\ln x}{2} \Big|_1^{+\infty}$$

Несходящая

$$\int_0^{\pi/2} \frac{1 + \cos x}{x^3} dx$$

$$\frac{1 - \cos x}{x^3} \sim \frac{x^2}{2}$$

$$\frac{x^2}{2x^3} < \frac{1}{2x}$$

N5 II подинтегр.  $x \rightarrow 0$

$$q = 1 \quad q = 1$$

Несходящая