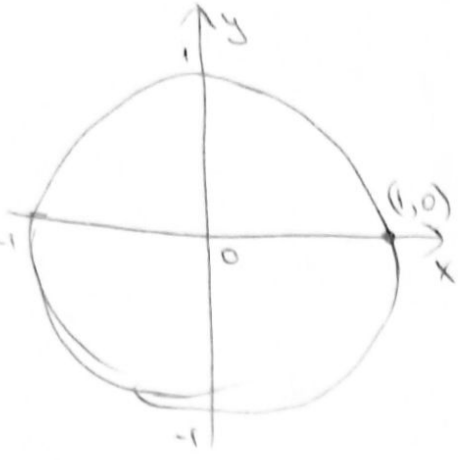
N1.2.




$$(x, y) \longrightarrow (r, \varphi)$$

$$\begin{cases} r = 1 \\ \varphi_i = [0, 2\pi] \\ i = 1, 2 \\ \varphi_0 = 0 \end{cases}$$

длина искомой дуги

$$L = r \cdot \left(2\pi - \max\{\varphi_2 - \varphi_1, \varphi_1 - \varphi_2\}\right)$$

$$\mathbb{E}(l) = 2\pi - \mathbb{E}\left(\max\{\varphi_2 - \varphi_1, \varphi_1 - \varphi_2\}\right)$$

$$P_{\varphi_2} = \frac{1}{2\pi}, \ \varphi_2 \in [0, 2\pi)$$

$$P_{\varphi_3} = \frac{1}{2\pi}, \ \varphi_3 \in [0, 2\pi)$$

$$\Rightarrow P_{\varphi_3 - \varphi_2} = \int_0^{2\pi} \frac{d\varphi}{4\pi^2} = \frac{1}{2\pi}, \ \varphi_3 - \varphi_2 \in [0, 2\pi) \quad (I)$$

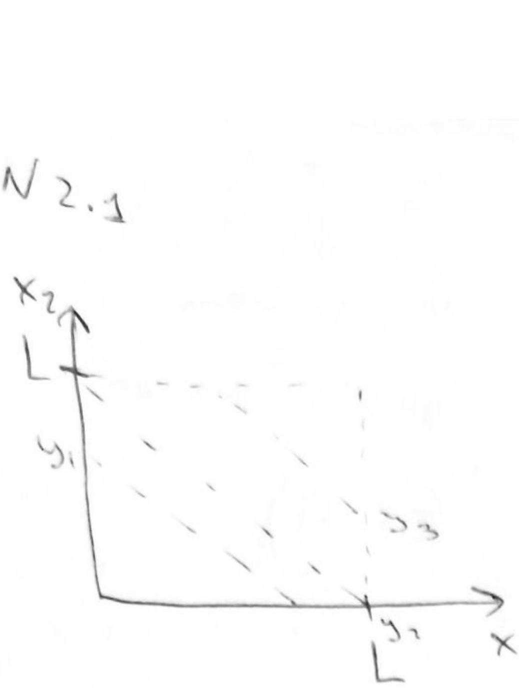
$$P_{\varphi_2 - \varphi_1} = \frac{1}{2\pi}, \ \varphi_2 - \varphi_1 \in [0, 2\pi) \quad (II)$$

$$\mathbb{E}(l) = 2\pi - \mathbb{E}\left(\max\{\varphi_2 - \varphi_1, \varphi_1 - \varphi_2\}\right)$$

т.к. (I) = (II), то ищем $0 \le \varphi_1 \le \varphi_2 < 2\pi$

$$\mathbb{E}(l) = 2\pi - \int_0^{2\pi} \frac{\varphi_2 - \varphi_1}{2\pi} d[\varphi_2 - \varphi_1] = 2\pi - \frac{(\varphi_2 - \varphi_1)^2}{2 \cdot 2\pi}\Bigg|_0^{2\pi} = \underline{\pi}$$

N 2.1




$y = x_1 + x_2$

функция распред. $F(y)$ - площ. под графиком $y \leq x_1 + x_2$

$$\Rightarrow \cancel{F_{x_1+x_2}(y) = \frac{1}{2}\int_0^{\min(L,y)} \frac{1}{L}\, dx_1 \int_0^{\min(L,y)} \frac{1}{L}\, dx_2 =} \ \min$$

$$F(y) = \begin{cases} \frac{y^2}{2L^2}, & y \leq L \\ \frac{L^2 - (2L-y)^2/2}{L^2}, & y > L \end{cases}$$

$$p(y) = \frac{dF}{dy} = \begin{cases} \frac{y}{L^2}, & y \leq L \\ \frac{-y+2L}{L^2}, & y > L \end{cases} = \begin{cases} \frac{y}{L^2}, & y \leq L \\ \frac{2L-y}{L^2}, & y > L \end{cases}$$

$$p(x_1, x_2) \overset{x_1, x_2 \in [0, L]}{=} \begin{cases} \frac{x_1 + x_2}{L^2} & y \leq L \\ \frac{2L - x_1 - x_2}{L^2} & y > L \end{cases}$$