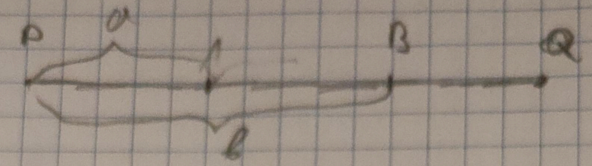
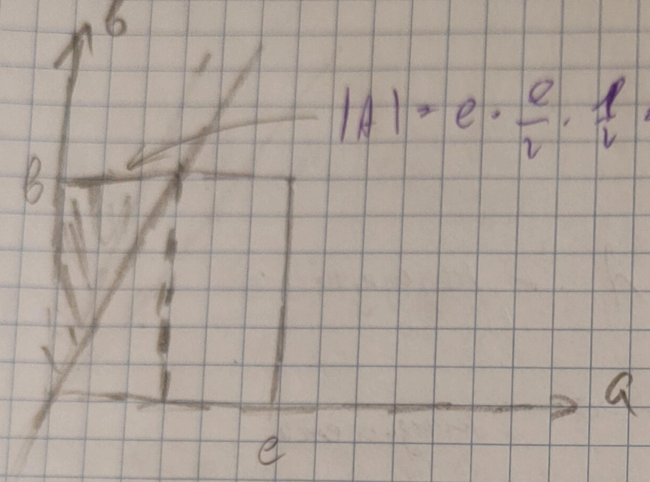
ДЗ №3



$PQ = l$

а) $\Omega = \{a, b \in [0, l]\} \Rightarrow |\Omega| = l^2$

$b - a > a \Rightarrow b > 2a$



$|A| = l \cdot \frac{l}{2} \cdot \frac{1}{2} = \frac{l^2}{4}$

$P(A) = \frac{\frac{l^2}{4}}{l^2} = \frac{1}{4}$

б) $P(\bar{A}) = 1 - P(A) = \frac{3}{4}$

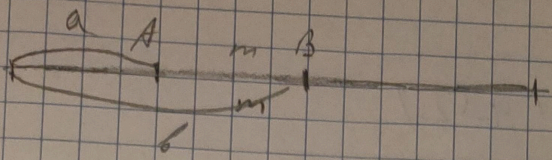
г) Ω — об'єм сфери

$|\Omega| = \frac{4\pi R^3}{3}$

A — шукана подія, Розглянемо $\bar{A}$ — всі N точок лежать за межами сфери радіусу r

$$P(\bar{A}) = \left(\frac{\frac{4}{3}\pi R^3 - \frac{4}{3}\pi r^3}{\frac{4}{3}\pi R^3}\right)^N = \left(1 - \frac{r^3}{R^3}\right)^N$$

$$P(A) = 1 - P(\bar{A}) = 1 - \left(1 - \frac{r^3}{R^3}\right)^N$$

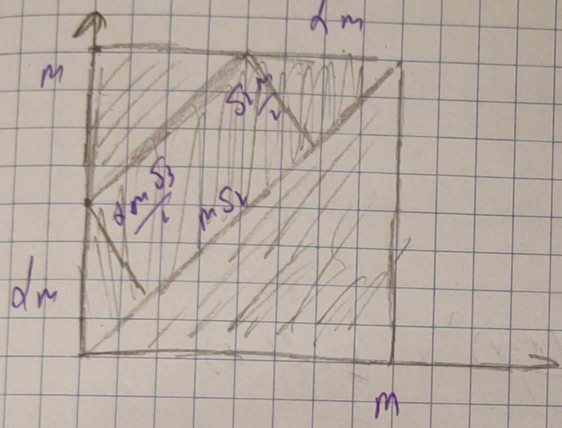
3) 

$b-a<\alpha m, \quad \alpha\in[0,1]$

$\Omega=\{a, b\in[0,m], \ \alpha\in[0,1]\} \Rightarrow \Omega = m^2$

$A=\{|b-a|<\alpha m\}$

при $b>a$



$$S=\frac{\left(mS_2+mS_2-\frac{S_2\alpha m}{S_1}\right)}{2}\cdot\frac{2\alpha m}{S_1}=$$

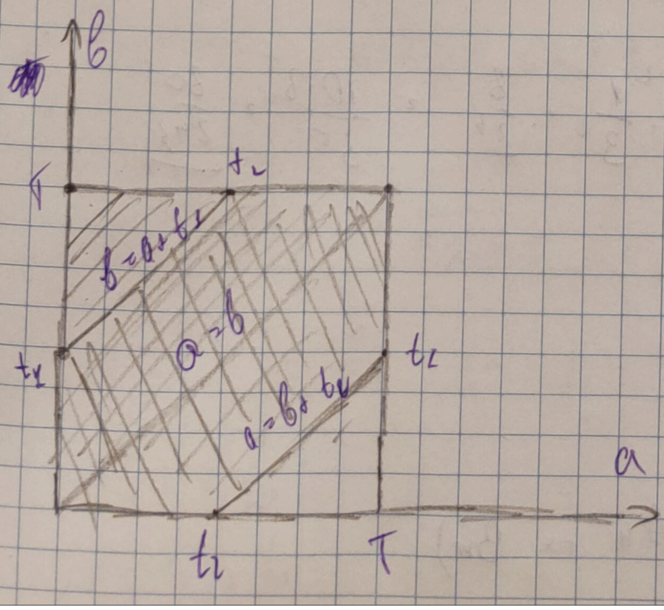
$$=\frac{2mS_2-S_2\alpha m}{2}\cdot\frac{\alpha m}{S_2}=$$

$$=\frac{(2mS_2-S_2\alpha m)}{2}\cdot\frac{\alpha m}{S_2}=$$

$$=\frac{m^2(2-\alpha)}{2}\cdot\alpha m=\frac{\alpha m^2(2-\alpha)}{2}$$

$$P(A)=2\cdot\frac{\alpha m^2(\alpha\cdot 2-\alpha)}{2}=\frac{2\alpha(2-\alpha)}{2}=\alpha(2-\alpha)$$

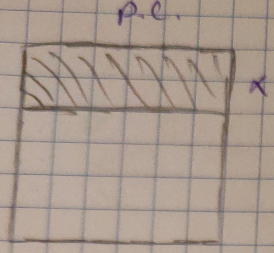
4) $\Omega=\{a\in[0,T], \ b\in[0,T]\} \Rightarrow |\Omega|=T^2$



$$P(A)=\frac{S_{кв}-S_{\Delta_1}-S_{\Delta_2}}{S_{кв}}=$$

$$=\frac{T^2-\frac{1}{2}(T-t_2)^2-\frac{1}{2}(T-t_1)^2}{T^2}$$

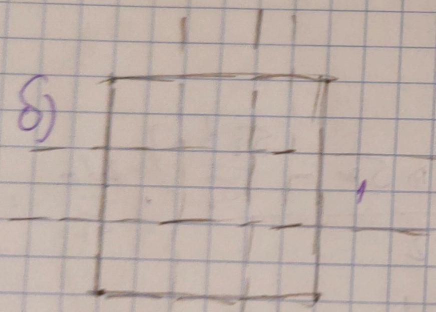
6) а)



$\Rightarrow S = 1 = |\Omega|$

$|A| = S_x = 1 \cdot x = x \Rightarrow P(A) = \frac{x}{1} = x$

б)



$|\Omega| = 1$

$|\bar{B}| = (1-x)^2$

$|B| = 1-(1-x)^2 \Rightarrow P(B) = \frac{1-(1-x)^2}{1} = 1-(1-x)^2$