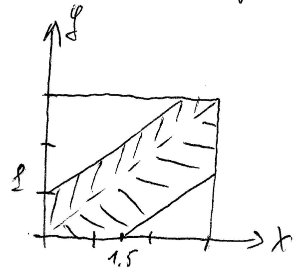
Билет. № 8.01.

№1. Геометрическое определение вероятности.

$P(A) = \frac{\mu(A)}{\mu(\Omega)}$, где $\mu(A)$, $\mu(\Omega)$ - геометрические меры (длины, площади, объёмы)



$\mu(\bar{A}) = \frac{9}{8} + 2 = \frac{25}{8}$

$\mu(A) = 9 - \frac{25}{8} = \frac{47}{8}$

$\mu(\Omega) = 9$

$P(A) = \frac{47}{8 \cdot 9} = \left(\frac{47}{72}\right)^2$

№2.

Нормальное распределение.

$f_\xi(x) = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{\frac{-(x-a)^2}{2\sigma^2}}$ a - мат. ожидание $D\xi = \sigma^2$ $F(x) = \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{(z-a)^2}{2\sigma^2}} dz$

Задача:

$\xi \sim N(a, \sigma^2)$

$a = 1$

$\sigma = 2$

$P(\xi^2 - 2\xi - 15 < 0) = P(-3 < \xi < 5) = P(5) - P(-3) = \Phi\left(\frac{5-1}{2}\right) - \Phi\left(\frac{-3-1}{2}\right) = \Phi(2) - \Phi(-2) = 2\Phi(2)$

№3.

Геометрическое распределение $P_k = q^k p$

$p = \frac{1}{6}$ $q = \frac{5}{6}$

$M\xi = \frac{q}{p} = 5$

$D\xi = \frac{q}{p^2} = 6 \cdot 5 = 30$

$D\xi = M\xi^2 - (M\xi)^2 \Rightarrow M\xi^2 = D\xi + (M\xi)^2 = 30 + 25 = 55$

$M\eta = M\xi^2 - 12M\xi + 1 = 55 - 60 + 1 = -4$

№4.

$\eta \backslash \xi$	-1	0	1
-1	2C	C	2C
0	C	0	C
1	2C	C	2C

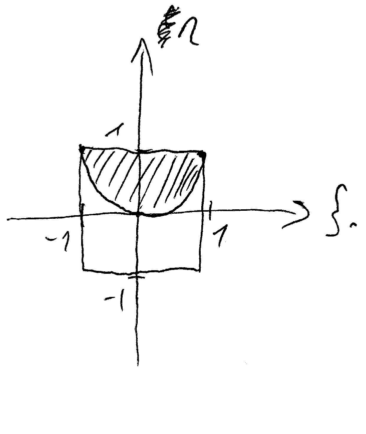
$8C + 4C = 1$

$C = \frac{1}{12}$

$\xi \cdot \eta$	-1	0	1
P	1/3	1/3	1/3

$M(\xi \cdot \eta) = 0$

№5.



ξ, η - р.р. $[-1, 1]$

$\psi = \xi^2 - \eta$

$F_\psi(z) = P(\psi \le z) = P(\xi^2 - \eta \le z) = \frac{S_{D_z \cap G}}{S_G} \ominus$

$D_z = \{(x,y) \mid x^2 - y \le z\}$ $\ominus$ $\frac{2 - \int_{-1}^{1} x^2 dx}{4} = \frac{4}{3 \cdot 4} = \frac{1}{3}$