Билет №2.06.

№1. Биномиальное распределение

$P_k = C_n^k p^k q^{n-k}$

$M\xi = n\cdot p$

$D\xi = n\cdot p\cdot q$

Задача.

$P(\xi^2-5\xi \geq 0) = P(0\le \xi \le 5)$

$P(0)+P(5) = C_5^0\cdot 1\cdot\left(\frac{2}{3}\right)^5 + C_5^5\left(\frac{1}{3}\right)^5\cdot 1 = \frac{1\cdot 32}{243}+\frac{1}{243} = \frac{33}{243}$

№2

$f_\xi = \begin{cases}\frac{1}{(b-a)}, & x\in[a,b]\\ 0, & \text{иначе}\end{cases}$ $\quad M\xi = \frac{a+b}{2}$ $\quad D\xi = \frac{(b-a)^2}{12}$ $\quad F_\xi = \begin{cases}\frac{x-a}{b-a} & a\le x\le b\\ 0, & x<a\\ 1, & x>b\end{cases}$ Равномерное распределение на отрезке.

Задачи.

$M\xi = -1$ $\quad D\xi = 3$ $\quad \cancel{\sigma_\xi = \sqrt{3}}$

ξ - р.р. $[a,b]$

По функции распределения, $P(a)=0$, а $P(b)=1$

№3.

$$\frac{C_7^3\cdot C_3^2}{C_{10}^5} = \frac{\frac{7\cdot 6\cdot 5}{1\cdot 2\cdot 3}\cdot\frac{3\cdot 2}{1\cdot 2}}{\frac{10\cdot 9\cdot 8\cdot 7\cdot 6}{1\cdot 2\cdot 3\cdot 4\cdot 5}} = \frac{7\cdot 5\cdot 3}{9\cdot 7\cdot 4} = \frac{15}{36} = \frac{5}{12}$$

№4.

ξ_1	-1	1
p	1/4	3/4

ξ_2	-1	1	2
p	1/6	1/2	1/3

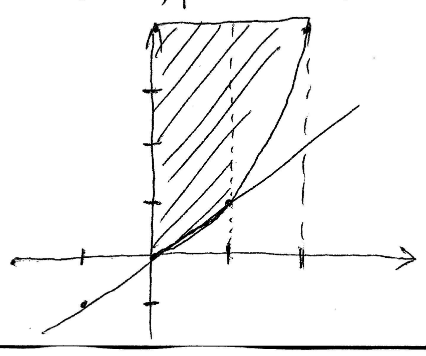
$\xi_2 \backslash \xi_1$	-1	1
-1	-1 1/24	1 3/24
1	1 1/8	1 3/8
2	2 1/12	2 3/12

η	-1	1	2
p	1/24	15/24	1/3

$M\eta = -\frac{1}{24}+\frac{15}{24}+\frac{16}{24} = \frac{30}{24} = \frac{5}{6}.$

№5.

$G = \{(x,y) \mid x\in(0,2),\ x^2<y<4\}$



$$\frac{3,5+4-\int_1^2 x^2dx}{8-\int_0^2 x^2dx} = \frac{7,5-\left(\frac{x^3}{3}\Big|_1^2\right)}{8-\left(\frac{x^3}{3}\Big|_0^2\right)} = \frac{7,5-\frac{7}{3}}{8-\frac{8}{3}} = \frac{\frac{15}{2}^{13}-\frac{7}{3}^{12}}{\frac{16}{3}} = \frac{(45-14)\cdot\cancel{3}}{2\cancel{6}\cdot 16} = \frac{31}{32}$$