№1 $\xi \sim Bi(n, p)$

$$\mathbb{P}(\xi = k) = C_n^k \, p^k (1-p)^{n-k}$$

$$\mathbb{E}\xi = \sum_{x \in X} x \, \mathbb{P}(\xi = x) = \sum_{k=0}^{n} k C_n^k p^k (1-p)^{n-k} =$$

$$= \sum_{k=0}^{n} \frac{n!}{k!(n-k)!} \cdot k \cdot p^k (1-p)^{n-k} = \sum_{k=0}^{n} \frac{n!}{(k-1)!(n-k)!} \cdot p^k \cdot (1-p)^{n-k} = \sum_{k=0}^{n} \frac{n(n-1)!}{(k-1)!(n-k)!} p^k (1-p)^{n-k} =$$

$$= \sum_{k=1}^{n} n C_{n-1}^{k-1} p \cdot p^{k-1} (1-p)^{n-k} = np \underbrace{\sum_{k=1}^{n} C_{n-1}^{k-1} p^{k-1} (1-p)^{n-k}}_{=1} =$$

$$= np$$

$$\Downarrow$$

$\underline{\mathbb{E}\xi = np}$

$$\mathbb{E}\xi^2 = \sum_{k=0}^{n} k^2 C_n^k p^k (1-p)^{n-k}$$

$$\mathbb{E}\xi^2 = \mathbb{E}\xi(\xi-1) + \mathbb{E}\xi$$

$$\mathbb{E}\xi(\xi-1) = \sum_{k=1}^{n} k(k-1) C_n^k p^k (1-p)^{n-k} =$$

$$= \sum_{k=1}^{n} \frac{n! \, k \cdot (k-1)}{k!(n-k)!} \cdot p^k (1-p)^{n-k} = \sum_{k=1}^{n} \frac{n! \, p^k (1-p)^{n-k}}{(k-2)!(n-k)!} =$$

$$= \sum_{k=2}^{n} n \cdot p^2 (n-1) C_{k-2}^{n-2} p^{k-2} (1-p)^{n-k} = n^2 p^2 - n p^2$$

$$\mathbb{D}\xi = \mathbb{E}\xi^2 - (\mathbb{E}\xi)^2 = \mathbb{E}\xi(\xi-1) + \mathbb{E}\xi - (\mathbb{E}\xi)^2 =$$

$$= \cancel{n^2 p^2} - np^2 + np - \cancel{n^2 p^2} = np(1-p)$$

Ответ: $\mathbb{E}\xi = np$

$\mathbb{D}\xi = np(1-p)$