N8.6

$n=4$

$p=0{,}9$

$P(A_i)=1-p=1-0{,}9=0{,}1$

$P(\bar{A}_i)=p=0{,}9$

$X: 0,\ 1, 2, 3, 4$

$P\{X=0\}=p_0=P(\bar{A}_1\cdot\bar{A}_2\cdot\bar{A}_3\bar{A}_4)=P(\bar{A}_1)P(\bar{A}_2)P(\bar{A}_3)P(\bar{A}_4)=$

$=0{,}9\cdot0{,}9\cdot0{,}9\cdot0{,}9=\cancel{0{,}6561}=0{,}6561$

$p_1=P_4(1)=C_4^1q^1p^{4-1}=\frac{4!}{3!}\cdot0{,}1\cdot0{,}9^3=0{,}2916$

$p_2=P_4(2)=C_4^2q^2p^{4-2}=\frac{4!}{2!(4-2)!}\cdot0{,}1^2\cdot0{,}9^2=0{,}0486$

$p_3=P_4(3)=C_4^3q^3p^{4-3}=\frac{4!}{3!(4-3)!}\cdot0{,}1^3\cdot0{,}9=0{,}0036$

$p_4=P_4(4)=C_4^4q^4p^{4-4}=\frac{4!}{4!(4-4)!}\cdot0{,}1^4\cdot0{,}9^0=0{,}0001$

X_i	0	1	2	3	4
p_i	0,6561	0,2916	0,0486	0,0036	0,0001

$\sum_{i=0}^{4}p_i=1$

N 9.6

X_i	-1	1	5	7
p_i	0,2	0,33	0,24	0,23

$$M[X] = \sum_i^4 x_i p x_i = -1\cdot 0,2 + 1\cdot 0,33 + 5\cdot 0,24 + 7\cdot 0,23 =$$

$$= 2,94$$

$$D[X] = \sum_i^4 x_i^2 p_i - [M(X)]^2 = (-1)^2\cdot 0,2 + 1\cdot 0,33 + 2^2\cdot 0,24 + 7^2\cdot$$

$$\cdot 0,23 - 2,94^2 = 9,1564$$

$$\sigma[X] = \sqrt{D} = \sqrt{9,1564} \approx 3,02595$$

N 10.6

$$F(x) = \cancel{\begin{cases} 0, x \le -1 \\ \frac{9(x^2-4)}{5x^2}, 2 < x \le 3 \\ 1, x > 3 \end{cases}} \qquad \begin{cases} 0, x \le -1 \\ \frac{(x+1)^2}{16}, -1 < x \le 3 \\ 1, x > 3 \end{cases}$$

~~$\alpha = 0; \beta = 1$~~ $\qquad \alpha = 0; \beta = 1$

a

~~$0 < x < 1$~~

~~$P(0 < x < 1) = F(0) - F(1)$~~ $\qquad P(0 < x < 1) = F(1) - F(0)$

$F(1) = \frac{(1+1)^2}{16} = \frac{2}{8} = \frac{1}{4}$

$F(0) = \frac{(0+1)^2}{16} = \frac{1}{16}$

$P(0<x<1) = \frac{1}{4} - \frac{1}{16} = \frac{3}{16} = \cancel{0{,}0625}\ 0{,}1875$

б

$$f(x) = F'(x) = \begin{cases} 0, & x \le -1 \\ \frac{x}{8} + \frac{1}{2}, & -1 < x \le 3 \\ 0, & x > 3 \end{cases}$$

в

$$M[X] = \int_{-\infty}^{+\infty} x f(x)\, dx = \int_{-\infty}^{-1} x \cdot 0\, dx + \int_{-1}^{1} x\left(\frac{x}{8} + \frac{1}{2}\right) dx + \int_{3}^{+\infty} x \cdot 0\, dx = 0 + \left(\frac{x^3}{24} + \frac{x^2}{4}\right)\Bigg|_{-1}^{3} + 0 = \frac{3^3}{24} + \frac{3^2}{4} - \left(\frac{(-1)^3}{24} + \frac{(-1)^2}{4}\right) =$$

$$= \frac{19}{6}$$

$$D[X] = \int_{-\infty}^{+\infty} x^2 f(x)\, dx - (M[X])^2 = \int_{-1}^{3} \frac{x^3}{8} + \frac{x^2}{2}\, dx - \left(\frac{19}{6}\right)^2 =$$

$$= \left(\frac{x^4}{32} + \frac{x^3}{6}\right)\Bigg|_{-1}^{3} - \left(\frac{19}{6}\right)^2 = \frac{3^4}{32} + \frac{3^3}{6} - \left(\frac{(-1)^4}{32} + \frac{(-1)^3}{6}\right) - \left(\frac{19}{6}\right)^2 = \frac{48}{6} - \frac{19}{6} \approx 4$$

$\sigma[X] = \sqrt{D} = \sqrt{4} = 2$