Ehtimollik va statistika

211-19-guruh

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2-variant.

1) 2) Yashikda 3ta oq va 7 ta qora shar Bor Yashikdan tavakkaliga 2ta shar olindi Olingan ikkala sharning ham qora bolish ehtimolini toping.

Yashikdan 2ta shar tanlanishlar soni C_{10}^2 ta

Faqat qora shar tanlanishlar soni C_7^2 ta

$$P(A) = \frac{C_7^2}{C_{10}^2} = \frac{\frac{7!}{2!\cdot 5!}}{\frac{10!}{8!\cdot 2!}} = \frac{21}{45} = \frac{7}{15}$$

Demak J: $\frac{7}{15}$

2)2) Talabaga kerakli formulani uchta mustaqil nomada bo'lishi ehtimolli mos ravishda 0,6; 0,7; 0,8 ga teng Formula: a) faqat bitta mustaqil nomada. B) faqat ikkita mustaqil nomada; c) uchchala mustaqil nomada bo'lishi ehtimolini toping.

a) $P(A) = p_1 \cdot (1-p_2) \cdot (1-p_3) +$

$+ p_2 \cdot (1-p_1) \cdot (1-p_3) + p_3 \cdot (1-p_1) \cdot (1-p_2)$

$p_1 = 0,6 \quad p_2 = 0,7 \quad p_3 = 0,8.$

$P(A) = 0,6 \cdot (1-0,7) \cdot (1-0,8) + 0,7 \cdot (1-0,6) \cdot (1-0,8) +$

$+ 0,8 \cdot (1-0,6) \cdot (1-0,7) = 0,036 + 0,056 + 0,096 =$

$= 0,188$

b) $P(B) = p_1 \cdot p_2 \cdot (1-p_3) + p_1 \cdot p_3 \cdot (1-p_2) +$

$+ p_2 \cdot p_3 \cdot (1-p_1) = 0,6 \cdot 0,7 \cdot 0,2 + 0,6 \cdot 0,8 \cdot 0,3 +$

$+ 0,8 \cdot 0,7 \cdot 0,4 = 0,084 + 0,144 + 0,216 =$

$= 0,444.$

c) $P(C) = p_1 \cdot p_2 \cdot p_3 = 0,6 \cdot 0,7 \cdot 0,8 = 0,336.$

J: a) 0,188 b) 0,444 c) 0,336.

3) 2) Birinchi idishda 10 ta shar. bōlib ularning 8 tasi oq, ikkinchi idishda 20 ta shar bōlib ularning 4 tasi oq. Har bir idishdan tavakkaliga bittadan shar olinib keyin bu ikki shardan yana bitta shar tavakkaliga olindi. Olingan sharning oq bōlish ehtimolini toping.

Demak olingan sharning boshqa rangli bōlish ehtimolligini 1 dan ayiramiz.

$$P(A) = 1 - P(B).$$

$$P(B) = \frac{C_2^1}{C_{10}^1} \cdot \frac{C_{16}^1}{C_{20}^1} = \frac{2!}{1! \cdot 1!} \cdot \frac{\frac{16!}{15! \cdot 1!}}{\frac{20!}{19! \cdot 1!}} =$$

$$= \frac{2}{10} \cdot \frac{16}{20} = \frac{1}{5} \cdot \frac{4}{5} = \frac{4}{25}$$

$$P(A) = 1 - P(B) = 1 - \frac{4}{25} = \frac{21}{25}$$

J: $\frac{21}{25}$.

4)2). Biror mergan uchun BTh o'q urishda nishonga tegishi ehtimoli 0,8 ga teng va o'q urish tartibiga bog'liq emas. 5 marta o'q urilganda nishonga rosa 2 marta tegishi ehtimolini toping.

n ta tajribadan A hodisaning roppa rosa k marta ro'y berish ehtimoli Bernulli formulasi yordamida

$$P_n(k) = C_n^k p^k q^{n-k}$$ topiladi.

Demak.

$p=0,8 \quad n=5 \quad k=2 \quad q=1-p=0,2$

$P(A) = P_5(2) = C_5^2 \cdot 0,8^2 \cdot 0,2^3 =$

$= \frac{5!}{3! \cdot 2!} \cdot 0,64 \cdot 0,008 = 0,64 \cdot 0,08 = 0,0512.$

J: 0,0512.

5) 2). Qutida 7 ta shar bo'lib ularning to'rttasi oq, qolganlari qora. Qutidan tavakkaliga 3 ta shar olinadi. X - olingan oq sharlar soni. M(X) - ?.

$$M(X) = \sum_{i=1}^{n} n \cdot p_i .$$

n - Olingan sharlar eng ko'pi bilan oq chiqishlar soni.

p_i - o'sha sondagi oq chiqishlar ehtimolligi.

$n = 3$.

$$p_i = p_1 = \frac{C_4^1 \cdot C_3^2}{C_7^3} = \frac{4 \cdot 3}{35} = \frac{12}{35}$$

$$p_2 = \frac{C_4^2 \cdot C_3^1}{C_7^3} = \frac{6 \cdot 3}{35} = \frac{18}{35}$$

$$p_3 = \frac{C_4^3}{C_7^3} = \frac{4}{35}.$$

$$M(X) = 1 \cdot \frac{12}{35} + 2 \cdot \frac{18}{35} + 3 \cdot \frac{4}{35} =$$

$$= \frac{12}{35} + \frac{36}{35} + \frac{12}{35} = \frac{60}{35} = \frac{12}{7} = 1\frac{5}{7}$$

6) 2) X uzluksiz tasodifiy miqdorning zichlik funksiyasi (Koshi taqsimot qonuni) butun O x oqida

$$f(x) = \frac{2C}{1+x^2}$$

tenglik bilan berilgan. C o'zgarmas parametrni toping.

Demak

$$\int_{-\infty}^{\infty} f(x)dx = 1.$$

$$\int_{-\infty}^{\infty} \frac{2C}{1+x^2} dx = 1.$$

$$2C \operatorname{arctg} x \Big|_{-\infty}^{\infty} = 1$$

$$2C\left(\frac{\pi}{2} - \frac{3\pi}{2}\right) = 1.$$

$$2C \cdot (-\pi) = 1$$

$$C = \frac{-1}{2\pi}. \quad J: C = \frac{-1}{2\pi}$$