$\boxed{1a}$ (1) 球8個(白5, 赤3)から3個取り出す試行

$$n(\Omega) = {}_8C_3 = \frac{8\cdot7\cdot\cancel{6}}{\cancel{3}\cdot\cancel{2}\cdot1} = 56$$

(2) $$n(A) = {}_5C_2 \times {}_3C_1 = \frac{5\cdot\cancel{4}^{2}}{\cancel{2\cdot1}} \times \frac{3}{1} = 30$$

(3) $$P(A) = \frac{n(A)}{n(\Omega)} = \frac{30}{56} = \frac{15}{28}$$

$\boxed{1b}$ (4) $$\Omega = \{(i, j) \mid i, j = 1, 2, \cdots, 6\}$$

$$n(\Omega) = 6 \times 6 = 36$$

(5) $$B = \{(3,6), (4,5), (5,4), (6,3)\}$$

(6) $n(B) = 4$ $$P(B) = \frac{n(B)}{n(\Omega)} = \frac{4}{36} = \frac{1}{9}$$

$\boxed{2}$ (1) $$n(\Omega) = {}_8C_3 = \frac{8\cdot7\cdot\cancel{6}}{\cancel{3\cdot2\cdot1}} = 56$$

(2) A_1 : 3個とも白 $$n(A_1) = {}_5C_3 \times {}_3C_0 = \frac{5\cdot\cancel{4}^{2}\cdot\cancel{3}}{\cancel{3}\cdot\cancel{2}\cdot1} \times 1 = 10$$

A_2 : 3個とも赤 $$n(A_2) = {}_5C_0 \times {}_3C_3 = 1 \times 1 = 1$$

(3) A_1 と A_2 は互いに独立だから、

$$P(A) = P(A_1 \cup A_2) = P(A_1) + P(A_2) = \frac{10}{56} + \frac{1}{56} = \frac{11}{56}$$

(4) $\bar{B} = A$: 3個とも同色

(5) $$P(B) = 1 - P(\bar{B}) = 1 - P(A) = 1 - \frac{11}{56} = \frac{45}{56}$$

$\boxed{3a}$ (1) $n(\Omega) = 3 \times 5 = 15$

$n(A) = 5$ $$P(A) = \frac{5}{15} = \frac{1}{3}$$

$n(B) = 3 \times 2 = 6$ $$P(B) = \frac{6}{15} = \frac{2}{5}$$

(2) $A \cap \bar{B}$: 赤の1, 2, 3 $n(A \cap \bar{B}) = 3$ $$P(A \cap \bar{B}) = \frac{3}{15}$$

(3) $$P(A \cup \bar{B}) = P(A) + P(\bar{B}) - P(A \cap \bar{B})$$

$$= \frac{5}{15} + 1 - \frac{6}{15} - \frac{3}{15} = \frac{11}{15}$$

$\boxed{3b}$ (4) $P(\bar{C}\cap\bar{D}) = P(\overline{C\cup D}) = 1 - P(C\cup D)$

$= 1 - \{P(C) + P(D)\} = 1 - \left(\frac{1}{2} + \frac{1}{3}\right) = 1 - \frac{5}{6} = \frac{1}{6}$

$\boxed{5}$ (1) $P(E_1) = \frac{2}{2+3} = \frac{2}{5}$ $\quad P(E_2) = \frac{3}{2+3} = \frac{3}{5}$

(2) $P(F|E_1) = \frac{2}{100}$ $\quad P(F|E_2) = \frac{1}{100}$

(3) $P(F) = P(E_1\cap F) + P(E_2\cap F)$

$= P(E_1)P(F|E_1) + P(E_2)P(F|E_2)$

$= \frac{2}{5}\times\frac{2}{100} + \frac{3}{5}\times\frac{1}{100} = \frac{4+3}{500} = \frac{7}{500}$

(4) $P(E_1|F) = \frac{P(E_1\cap F)}{P(F)} = \frac{P(E_1)P(F|E_1)}{P(F)}$

$= \frac{\frac{2}{5}\times\frac{2}{100}}{\frac{7}{500}} = \frac{4}{7}$

$\boxed{6}$ (1) $p: \frac{1}{2}$ $\quad n=2$ $\quad$ (2) $P(E_k) = {}_2C_k\left(\frac{1}{2}\right)^k\left(\frac{1}{2}\right)^{2-k} = \frac{{}_2C_k}{2^2}$

$P(E_0) = \frac{{}_2C_0}{2^2} = \frac{1}{4}$ $\quad P(E_1) = \frac{{}_2C_1}{2^2} = \frac{2}{4} = \frac{1}{2}$ $\quad P(E_2) = \frac{{}_2C_2}{2^2} = \frac{1}{4}$

(3) $P(E_0) = \frac{1}{4}$ $\quad$ (4) $P(E_1) + P(E_2) = \frac{2}{4} + \frac{1}{4} = \frac{3}{4}$

$\boxed{4}$ (1) $n(\Omega) = 52$

$A = \{1\times2, 2\times2, \cdots, 26\times2\}$ $\quad n(A) = 26$ $\quad P(A) = \frac{26}{52} = \frac{1}{2}$

$B = \{1\times3, 2\times3, \cdots, 17\times3\}$ $\quad n(B) = 17$ $\quad P(B) = \frac{17}{52}$

(2) $A\cap B = \{1\times6, 2\times6, \cdots, 8\times6\}$

6の倍数 $\quad n(A\cap B) = 8$ $\quad P(A\cap B) = \frac{8}{52} = \frac{2}{13}$

(3) $P(A)P(B) = \frac{1}{2}\times\frac{17}{52} = \frac{17}{104} \neq \frac{16}{104} = \frac{8}{52} = P(A\cap B)$

A, Bは 互いに独立でない

(4) $P(B|A) = \frac{P(A\cap B)}{P(A)} = \frac{8/52}{26/52} = \frac{8}{26} = \frac{4}{13}$

$\boxed{7}$ (1) $n=3$ $\quad p=\frac{2}{6}=\frac{1}{3}$ $\quad$ (2) 2項分布 $B(3,\frac{1}{3})$

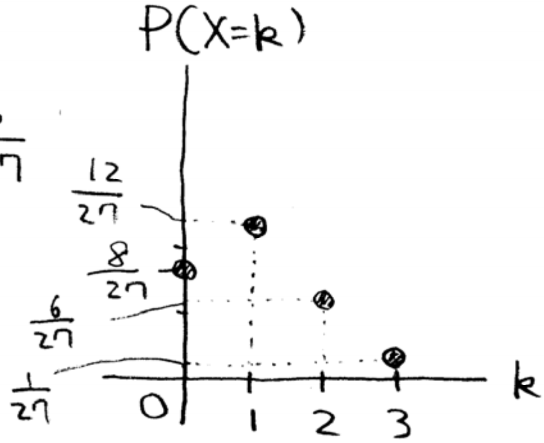
(3) $P(X=k)={}_3C_k\left(\frac{1}{3}\right)^k\left(1-\frac{1}{3}\right)^{3-k}={}_3C_k\,\frac{2^{3-k}}{3^3}$

$$P(X=0)={}_3C_0\frac{2^3}{3^3}=\frac{2^3}{3^3}=\frac{8}{27}$$

$$P(X=1)={}_3C_1\frac{2^2}{3^3}=\frac{3}{1}\,\frac{2^2}{3^3}=\frac{12}{27}$$

$$P(X=2)={}_3C_2\frac{2^1}{3^3}=\frac{3\cdot\cancel{2}}{\cancel{2\cdot1}}\cdot\frac{2}{3^3}=\frac{6}{27}$$

$$P(X=3)={}_3C_3\frac{2^0}{3^3}=\frac{1}{3^3}=\frac{1}{27}$$



(4)

k	0	1	2	3	計
$P(X=k)$	$\frac{8}{27}$	$\frac{12}{27}$	$\frac{6}{27}$	$\frac{1}{27}$	1

$\boxed{8}$ (1) $n=500$ $\quad p=\frac{6}{1000}=\frac{3}{500}$ $\quad$ (2) 2項分布 $B\left(500,\frac{3}{500}\right)$

(3) $n=500$が十分に大きく, $p=\frac{3}{500}$が十分に小さく,

$\lambda=np=500\times\frac{3}{500}=3=$一定 であるという条件

$P_o(3)$ $\qquad P(X=k)=e^{-3}\frac{3^k}{k!}\quad(k=0,1,2,\cdots)$

(4) $P(X\geqq 3)=1-P(X\leqq 2)=1-\{P(X=0)+P(X=1)+P(X=2)\}$

$$=1-e^{-3}\left(\frac{3^0}{0!}+\frac{3^1}{1!}+\frac{3^2}{2!}\right)=1-e^{-3}\left(1+3+\frac{9}{2}\right)=1-\frac{17}{2}e^{-3}$$