Probability

1. $$\frac{15 \times 14 \times 13 \times \cdots\cdots \times 8}{15^8} = 0.1012$$

2. $$P = \frac{5\times4\times5\times7\times6 \cancel{+5\times4\times5\times7+5\times4\times5}}{10^5} = \cancel{\frac{1}{26}}\ 0.042$$

$0.00000643.$

$$\binom{8}{5} p^5 (1-p)^3 = \cancel{0.00000643}\ \cancel{0.000015}$$

3. $P(B) = \frac{1}{36}$ $\quad P(A) = \left(\frac{1}{2}\right)^3 \times 3 + \left(\frac{1}{2}\right)^3 = \frac{1}{2}$ $\quad P(A \wedge B) = \frac{3}{6^3} = \frac{1}{72}$

$\cancel{P(B|A) = \frac{1}{3} \times \frac{1}{6} = \frac{1}{18} \neq P(B)}$ $\quad \therefore P(A \wedge B) = P(A) \cdot P(B)$

$\therefore$ ~~not independent~~ $\quad \therefore$ independent

4. $$P = \frac{12}{51} \cdot \frac{11}{50} \cdot \frac{10}{49} \cdot \frac{9}{48} = 0.001981$$

$\because$ geometric distribution $\therefore E[X] = \frac{1}{P} = 504.80$

5. $P_s = \binom{5}{4} 0.7^4\ 0.3$

$P_{ns} = \binom{5}{4} 0.5^5$

$$\frac{0.75\,P_s}{0.75\,P_s + 0.25\,P_{ns}} = 0.8737$$