1.

stu $\leq 1$

$$\frac{\binom{15}{8}}{15^8} = \frac{6435}{2562890625} = 2.51\times10^{-6}$$

2.

$$\binom{5}{1}\binom{4}{1}\binom{8}{1}\binom{7}{1}\binom{6}{1}$$

$$P(\text{interested}) = \frac{5\times4\times8\times7\times6}{10^5} = 0.0672$$

odd

unique

$$\binom{8}{5}0.0672^5\, 0.9328^3 = 6.23\times10^{-5}$$

3.

$$\begin{aligned} P(A) &= P(X=2)+P(X=3) \\ &= \binom{3}{2}\frac{1}{2}^2\frac{1}{2} + \binom{3}{3}\frac{1}{2}^3\frac{1}{2}^0 \\ &= 3\times\frac{1}{8} + \frac{1}{8} \\ &= \frac{4}{8} = \frac{1}{2} \end{aligned}$$

$$P(B) = \frac{6}{6^3} = \frac{1}{36}$$

$$P(A)\cdot P(B) = \frac{1}{72}$$

$$P(A\cap B) = \frac{3}{6^3} = \frac{1}{72}$$

$\because P(A)\cdot P(B) = P(A\cap B)$

$\therefore$ A and B are independent

4. $P(\text{flush}) = \dfrac{\binom{13}{5}\binom{4}{1}}{\binom{52}{5}} = \dfrac{1287 \times 4}{2598960} = 0.00198$

$E(x) = \dfrac{1}{p} = 504.\dot{8}\dot{4} \approx 505$

5. $P(w \mid \text{play}) = 0.7 \quad P(w \mid \text{notplay}) = 0.5$

$P(\text{play}) = 0.75$

$P(w4 \mid \text{play}) = \binom{5}{4} 0.7^4 0.3 = 0.36$

$P(w4 \mid \text{notplay}) = \binom{5}{4} 0.5^4 0.5 = 0.156$

Bayes: $P(\text{play} \mid w4) = \dfrac{0.36 \times 0.75}{0.36 \times 0.75 + 0.156 \times 0.25} = 0.8737$

$P(F \mid E) = \dfrac{P(E \mid F) \cdot P(F)}{P(E)}$