

Probability Problem

1)

$$\begin{array}{l} \text{total possibilities } 15^3 \\ \text{select 8 students } 15P_8 \end{array} \Rightarrow \frac{15P_8}{15^3} = 0.101 = 10.1\%$$

2)

$$\begin{array}{c} \underbrace{5 \ 4 \ 7 \ 6 \ 5}_{\text{Odd}} \quad \underbrace{2 \ 4 \ 6 \ 8}_{\text{Even}} \end{array} \quad \begin{array}{l} \text{Odd: } 1, 3, 5, 7, 9 \\ \text{Even: } 0, 2, 4, 6, 8 \end{array} \quad \begin{array}{l} \text{Probability of getting 1 \# : } 5 \cdot 4 \cdot 7 \cdot 6 \cdot 5 = 4200 \\ \text{Total \#} = 10^5 \end{array}$$

3 \# used, so

7 then 6 then

$$100 + 700 + 4200 = 5000 \Rightarrow \text{Probability of getting 1} \frac{5000}{10^5} = 0.05$$

$$\text{Total \#} = 10^5$$

$$0 \ 0 \ 5 \ 4 \ 5 \Rightarrow 100$$

$$0 \ 5 \ 4 \ 7 \ 5 \Rightarrow 700 \quad \binom{8}{5} (0.05)^5 (0.95)^2 = \frac{1}{10^5} = 1.5004 \cdot 10^{-5}$$

3)

$$\text{Event A: } 0.5$$

$$\binom{2}{1} (0.5)^2 (0.5) = 0.875 \quad \text{or} \quad \left(\frac{1}{2}\right)^2 = \frac{1}{8} = 0.125$$

$$\text{Event B:}$$

$$P(A \cap B) = \left(\frac{1}{2}\right)\left(\frac{1}{8}\right) = 0.0138 = P(A) \cdot P(B)$$

$$\left(\frac{1}{2}\right)^2 = \frac{1}{4} = 0.25$$

Yes, A and B are independent

$$\left(\frac{1}{2}\right)\left(\frac{1}{8}\right) = \frac{1}{16}$$

$$4) \frac{5 \text{ cards, same suit}}{\text{Pick 5 cards}} = \frac{\binom{13}{5} \binom{4}{1}}{\binom{52}{5}} = 0.00198 \quad \frac{1}{0.00198} = 504.8 \text{ hands}$$

5)

$$P(\text{win 4/5 games} \mid \text{plays}) = \binom{5}{4} (0.4)^4 (0.6) = 0.360$$

$$P(\text{win 4/5 games} \mid \text{no plays}) = \binom{5}{4} (0.5)^5 = 0.156$$

$$\frac{0.360 \cdot 0.45}{0.805} = \boxed{0.814}$$

$$P(\text{win 4/5 games}) = (0.360 \cdot 0.45) + (0.156 \cdot 0.805) = 0.164$$