

Probability Problems

1.

$$\frac{15}{15} \cdot \frac{14}{15} \cdot \frac{13}{15} \cdot \frac{12}{15} \cdot \frac{11}{15} \cdot \frac{10}{15} \cdot \frac{9}{15} \cdot \frac{8}{15}$$

$$= \boxed{0.1012}$$

$$2.00000 - 99999$$

↳ 100,000 total

$$\frac{5}{10} \cdot \frac{4}{10} \cdot \frac{7}{10} \cdot \frac{6}{10} \cdot \frac{5}{10} = \frac{4200}{100,000} = \frac{2}{50}$$

odd odd distinct even

$$0.042$$

$$\text{exactly 5: } 8C5 \cdot (0.042)^3 (1 - 0.042)^2$$

$$= \boxed{0.0033}$$

$$3. P(A) = 3C2 \left(\frac{1}{2}\right)^2 \left(\frac{1}{2}\right) + 3C3 \left(\frac{1}{2}\right)^3$$

$$\frac{3}{8} + \frac{1}{8} = \frac{1}{2}$$

$$P(B) = \frac{6}{6} \left(\frac{1}{6}\right)^2 = \frac{1}{36}$$

$$P(A \cap B) = \frac{3!}{26 \cdot 6 \cdot 6} = \frac{1}{72}$$

$$P(A) \cdot P(B) = \frac{1}{2} \cdot \frac{1}{36} = \frac{1}{72}$$

Independent

4. 1 suit/4 5/13 cards

$$P_{\text{flush}} = 4C_1 \cdot 13C_5$$

$$= \frac{4 \cdot 13!}{5!8!} = 5,148$$

$$\text{Total} = 52C5 = 2,598,960$$

$$\frac{5148}{2,598,960} = p \approx 0.0002$$

$$\frac{1}{p} = \frac{1}{0.0002} \approx \boxed{504.84}$$

5.

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

$$P(\text{not plays}) = 0.25$$

$$\begin{aligned} P(\text{win 4 games}) &= 5 \cdot (0.70)^4 (0.30)^1 (0.75) \\ &\quad + 5 \cdot (0.50)^4 (0.50)^1 (0.25) \\ &= 0.309 \end{aligned}$$

$$P(\text{plays and win 4}) = 0.75(5)(0.70)^4 (0.30)$$

$$\frac{0.27}{0.309} = \boxed{0.87} \approx 0.27011$$