Stats 130
Discussion 4 Notes

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Notes

- Quiz review

1. Red + Blue Balls

$$Pr(A) = \frac{7}{10} \tag{1}$$
$$Pr(B) = \frac{2}{10} \tag{2}$$
$$Pr(C) = \frac{1}{10} \tag{3}$$
$$Pr(R|A) = \frac{20}{30} \tag{4}$$
$$Pr(R|B) = \frac{10}{30} \tag{5}$$
$$Pr(R|C) = \frac{15}{30} \tag{6}$$
$$Pr(R) = Pr(R|A)Pr(A) + Pr(R|B)Pr(B) + Pr(R|C)Pr(C) \tag{7}$$
$$= \frac{35}{60} \tag{8}$$

2. Chance of ultimate victory

$$Pr(W) = 0.6 \tag{9}$$
$$Pr(M) = 0.3 \tag{10}$$
$$Pr(P) = 0.4 \tag{11}$$
$$Pr(W \cap M) = 0.26 \tag{12}$$
$$Pr(M \cap P) = 0.19 \tag{13}$$
$$Pr(W \cap P) = 0.37 \tag{14}$$
$$Pr(W \cap M \cap P) = 0.01 \tag{15}$$
$$Pr(W \cup M \cup P) \tag{16}$$
$$= Pr(W) + Pr(M) + Pr(P) - Pr(W \cap M) - Pr(W \cap P) - Pr(M \cap P) + Pr(M \cap W \cap P) \tag{17}$$
$$= 0.49 \tag{18}$$

3. Unfair die and Unfair coin

$$Pr(i) = \frac{i}{21}, i = 0, 1, 2...6 \tag{19}$$
$$Pr(H) = 0.4 \tag{20}$$
$$A = 2, 4, 6 \tag{21}$$
$$B = H \tag{22}$$
$$Pr(A^{\complement}) = Pr(1) + Pr(3) + Pr(5) = \frac{3}{7} \tag{23}$$
$$Pr(B^{\complement}) = 1 - Pr(H) = 0.6 \tag{24}$$
$$Pr(A^{\complement} \cap B^{\complement}) = 0.6 \times \frac{3}{7} \tag{25}$$
$$= \frac{9}{35} \tag{26}$$

- Practice Problems

1. $$Pr(D) = 0.75$$

   For 5 experiemnts what is the probaility that

   (a) Exactly 2

   $$Pr(2) = \binom{5}{2} 0.75^2 \times 0.25^3 \tag{27}$$

   $$Pr(2) = 0.08789 \tag{28}$$

   (b) at most 3

   $$Pr(4 \cup 5) = Pr(4) + Pr(5) \tag{29}$$

   $$= 0.3955078125 + 0.2373046875 = 0.6328125 \tag{30}$$

   $$Pr(\leq 3) = 1 - Pr(4 \cup 5) = 0.3671875 \tag{31}$$

2. percentage wins are 90%.

   (a) What is the probability that they win 4-0 in best of 7?

   $$Pr(4) = \binom{3}{0} 0.9^4 = 0.6561 \tag{32}$$

   (b) What is the probability a full 7 games will be played?

   $$Pr(7) = \binom{6}{3} 0.1^3 \times 0.9^4 = 0.013122 \tag{33}$$

   $$Pr(0) = \binom{6}{3} 0.9^3 \times 0.1^4 = 0.001458 \tag{34}$$

   $$Pr(7 \text{ games}) = 0.01458 \tag{35}$$