Practice Test #2 **STA 2023** **Name _____**

Section _____

1. Nine Poker chips (4 red chips, 3 blue chips and 2 green chips) are placed in a hat and are then randomly selected from the hat. Find the following Probabilities:

a) If a single chip is drawn from the hat, what is the probability the chip is red?

$$\text{P[red]} = \frac{n(red)}{n(S)} = \frac{4}{9} = 0.4444$$

b) If a single chip is drawn from the hat, what is the probability the chip is <u>not</u> red?

$$\text{P[not red]} = 1 - \text{P[red]} = 1 - \frac{4}{9} = 0.5556$$

c) If two chips are drawn from the hat, what is the probability that both chips are red?

$$\text{P[both red]} = \text{P[1}^{st}\text{ is red and 2}^{nd}\text{ is red]} = \frac{4}{9}\cdot\frac{3}{8} = 0.1667$$

d) If two chips are drawn from the hat, what is the probability the second chip is red?

$$\text{P[second is red]} = \text{P[1}^{st}\text{ is red and 2}^{nd}\text{ is red or 1}^{st}\text{ is not red and 2}^{nd}\text{ is red]}$$

$$= \frac{4}{9}\cdot\frac{3}{8} + \frac{5}{9}\cdot\frac{4}{8} = 0.4444$$

2. In one region, 30% of all residential telephone numbers are unlisted. If four residential housing units are randomly selected, find the probability that all of them have unlisted numbers.

0.0081

$$\text{P[all unlisted]} = \text{P[1}^{st}\text{ unlisted and 2}^{nd}\text{ unlisted and 3}^{rd}\text{ unlisted and 4}^{th}\text{ unlisted]}$$

$$= (0.30)(0.30)(0.30)(0.30)$$

$$= (0.30)^4$$

$$= 0.0081$$

3. **A legislative advisory committee consists of 20 Democrats (8 of whom are women) and 10 Republicans (3 of whom are women).**

(a) **Two of the committee members are randomly selected for a special research project. What is the probability that they are both Democrats?**

$$P[\text{both Dem}] = \frac{20}{30} * \frac{19}{29} = 0.4368$$

(b) **If the chairperson is randomly selected, find the probability of getting a Democrat or a man.**

$$P[D \text{ or } M] = P[D] + P[M] - P[D \cap M] = \frac{20}{30} + \frac{19}{30} - \frac{12}{30} = \frac{27}{30} = 0.900$$

(c) **At each meeting of this committee, one person is randomly chosen from the 30 members and that person must act as a secretary for the meeting. Find the probability that the first two meetings have male secretaries.**

$$P[\text{both M}] = \frac{19}{30} \cdot \frac{19}{30} = 0.4011$$

(d) **If one of the committee members is randomly selected as treasurer, find the probability that a women is chosen, given they are Republican.**

$$P[W \mid R] = \frac{P[W \cap R]}{P[R]} = \frac{3/30}{10/30} = 3/10 = 0.3000$$

(e) **Are gender and political affiliation mutually exclusive?** No

(f) **Are gender and political affiliation independent?** No

	Dem.	Rep.	Totals
Men	12	7	19
Women	8	3	11
Totals	20	10	30

4. **A three-person committee is to be selected at random from a group of five women and four men. Find the probability of selecting an all-woman committee.**

$$P[\text{all women}] = P[1^{st} \text{ woman and } 2^{nd} \text{ woman and } 3^{rd} \text{ woman}]$$

$$= \frac{5}{9} \cdot \frac{4}{8} \cdot \frac{3}{7} = .1190$$

or

$$P[\text{all women}] = \frac{n(W)}{n(S)} = \frac{{}_5C_3}{{}_9C_3} = .1190$$

5. **An unprepared student makes random guesses for the ten true-false questions on a quiz.**

(a) Find the probability that there is at least one correct answer. **a.**_____

$$P[\text{at least one correct}] = 1 - P[\text{none correct}] = 1 - \left(\frac{1}{2}\right)^{10} = \frac{1023}{1024} = 0.9990$$

(b) Find the probability that the answers are all correct? **b.**_____

$$P[\text{all correct}] = = \left(\frac{1}{2}\right)^{10} = \frac{1}{1024} = 0.000977$$

(b) Find the probability that the answers are either all correct or all wrong. **c.**_____

$$P[\text{all correct or all wrong}] = \left(\frac{1}{2}\right)^{10} + \left(\frac{1}{2}\right)^{10} = \frac{2}{1024} = 0.00195$$

6. **A Poker hand consists of 5 cards from a standard deck of 52 cards.**

(a) How many different Poker hands are possible? $_{52}C_5 = 2,598,960$

(b) Find the probability of being dealt a Flush
(Note: a Flush consists of all five cards in the same suit).

$$P[\text{Flush}] = \frac{n(Flush)}{n(S)} = \frac{{}_4C_1 \cdot {}_{13}C_5}{{}_{52}C_5} = .00198$$

7. **Complete the following:**

P[A]	P[A']	Odds In Favor	Odds Against
3/4	1/4	3:1	1:3
2/5	3/5	2:3	3:2
2/3	1/3	2:1	1:2
0.6	0.4	3:2	2:3