Name: _____   **Section: <u>MAT098/181C-</u>**

MAT098/181C EXAM #2 (FORM C)

*A scientific calculator is permitted. **<u>Cellphones may not be used as calculators and must be off or on vibrate during the exam</u>**. Show all work on the test or on the work paper provided.*

1.) Below is a table of Final Grades (A, B, or C) from Professor Jackson's Intro to Philosophy course, broken down by gender. *(20 points)*

	<u>A</u>	<u>B</u>	<u>C</u>	<u>Total</u>
Male	10	13	18	41
Female	13	19	15	47
Total	23	32	33	88

For each problem:

    i.   Please circle one: <u>Marginal</u>, <u>Conditional</u> or <u>Joint</u> probability.
    ii. Find the probability. Write your answer as a fraction **<u>and</u>** as a percentage.
         (Please round to the nearest tenth of a percent.)

a.) What is the probability that a randomly selected student received an "A"? *(5 pts)*

    1) Marginal Probability   2) Conditional Probability   3) Joint Probability

       23/88 = 26.1%

b.) What is the probability a student received an "A", given they are a male student? *(5 pts)*

    1) Marginal Probability   2) Conditional Probability   3) Joint Probability

                       10/41 = 24.4%

c.) Find the probability a student is female, given they received a "C" in the course? *(5 pts)*

    1) Marginal Probability   2) Conditional Probability   3) Joint Probability

                       15/33 = 45.5%

d.) What is the probability that a randomly selected student is Female <u>AND</u> received an "A" in the course? *(5 pts)*

    1) Marginal Probability   2) Conditional Probability   3) Joint Probability

                                    13/88 = 14.8%

2.) Below is a table of the hair color and eye color of the students at a local elementary school. *(15 points)*

	Black hair	Brown hair	Red hair	Blonde hair	Total
Brown eyes	28	48	9	3	88
Blue eyes	8	32	7	29	76
Hazel eyes	6	12	2	5	25
Green eyes	3	7	6	5	21
Total	45	99	24	42	210

(**You may write probabilities as fractions or percentages**)

a.) Fill in the column and row totals in the above graph *(2pts)*

SEE ABOVE

b.) What is the probability a student has Blue eyes AND Blonde hair? *(4 pts)*

29/210 = 13.8%

c.) What is the probability a student has Hazel eyes OR Red hair? *(4 pts)*

47/210 = 22.4%

d.) Which statement below is more likely: *(5 pts)*

      1. If I choose a student with Blue eyes, they will have Brown hair

      2. If I choose a student with Hazel eyes, they will have Brown hair.

Explain why you chose your answer.

Statement 2 is more likely

P(Brown hair | Blue Eyes) = 32/76 = 42.1%

P(Brown Hair | Hazel Eyes) = 12/25 = 48%

3.) A local weatherman has predicted that is will rain on either 0, 1, 2 or 3 days next week. The likelihood of how many days it will rain is given in the probability distribution below. *(21 points)*

Total # of days raining (x):	0	1	2	3
P(x):	0.15	0.25	0.40	0.20

a.) What is the probability that it will not rain at all next week? *(3 pts)*

0.15

b.) Find the probability that it will rain on *at least* 1 day next week? *(3 pts)*

0.85

c.) Find the probability that it will rain *no more than* 2 days next week? *(3 pts)*

0.80

d.) What is the expected value (mean) for the total number of days it will rain next week? *(6 pts)*

1.65

e.) What is the Standard Deviation for the total number of days it will rain next week? *(6 pts)*

0.963

4.) A wedding menu has a choice of soup or salad for an appetizer and for the main course the choices are either chicken, beef or fish. *(12 points)*

a.) Draw a tree diagram and specifically list all the possible combinations you have for the appetizer and main course. *(8 pts)*

Soup/Chicken Soup/Beef   Soup/Fish

Salad/Chicken   Salad/Beef   Salad/Fish

b.) If the next night you went to a restaurant that had 6 choices for appetizer, 12 choices for the main course, and 4 choices for dessert, how many possible combinations are there? *(4 pts)*   *(**Do not draw a tree diagram, just find the total number of possible meals**)*

288 possibilities

5.) For the questions below state which formula you are using and show the work answering each question. *(10 points)*

a.) The BHCC basketball team needs to name a captain and an assistant captain. If there are 12 members on the team, how many different possibilities are there for these positions?

Permutation   132 possibilities

b.) William is hosting a dinner party and would like to invite some of his friends. He has 8 friends he would like to invite but only has enough seats for 5 of them. How many different groups of 5 people could he invite over?

Combination   56 possibilities

6.) A study done at BHCC has shown that for all the students who pass a developmental math course, only 85% of them register for their next math course in the following semester. *(8 points)*

If we took a survey of 10 students who passed developmental math this semester:

a.) Identify the following: *(3 pts)*

$$n = \quad 10 \qquad\qquad p = \quad 0.85 \qquad\qquad q = \quad 0.15$$

b.) Find the probability that *exactly* 7 students register for math next semester. *(5 pts)*

0.130

7.) Mary's first exam for her Psychology course has 10 True/False Questions and 5 Multiple Choice questions with 4 answer choices each. Since Mary did not study at all, she is going to randomly guess on every question: *(14 points)*

a.) Find the probability that Mary gets *at least* 8 of the 10 True/False questions correct.

Begin by identifying the following: n = **10   p = **0.50**   q = **0.50**

$$0.044 + 0.010 + 0.001 = 0.055$$

b.) If the Multiple Choice questions had 5 choices for answers instead of 4, what is the probability that she gets *less than* 2 correct?

Begin by identifying the following: n = **5   p = **0.20**   q = **0.80**

$$0.328 + 0.410 = 0.738$$

(EXTRA CREDIT)

Mike is going to play two tennis matches against two different opponents. The probability that he wins his first match is 0.80. But the probability that he wins his second match against a tougher opponent is only 0.25.

a.) What is the probability he wins both matches?

0.20

b.) What is the probability he loses both matches?

0.15

c.) What is the probability he wins exactly 1 of the 2 matches?

0.65

Formulas

Mean for discrete probability distribution:

$$\mu = \sum [x \cdot P(x)]$$

Standard Deviation for a discrete probability distribution:

$$\sigma = \sqrt{\Sigma[(x - \mu)^2 \cdot P(x)]} \quad \text{OR} \quad \sigma = \sqrt{\Sigma[x^2 \cdot P(x)] - \mu^2}$$

Factorial:

$$n! = n \cdot (n - 1) \cdots 2 \cdot 1$$

Permutation:

$$_nP_r = \frac{n!}{(n - r)!}$$

Combination:

$$_nC_r = \frac{n!}{r! \cdot (n - r)!}$$

Binomial Probability:

$$P(r) = \ _nC_r \cdot p^r \cdot q^{(n-r)}$$

Mean & Standard Deviation for *binomial* probability distribution:

$$\mu = np$$

$$\sigma = \sqrt{npq}$$