Name: _____ **Section: MAT098/181C-**

MAT098/181C EXAM #2 (FORM A)

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

1. **For each problem (a) – (d)**
   i. **Please circle one: marginal, conditional or joint probability.**
   ii. **Then write your answer as a fraction and as a percentage. Please round to the nearest tenth.**

	Where do you tend to sit in class?			
	Front	**Middle**	**Back**	**Total**
Female	**37**	**91**	**22**	**150**
Male	**15**	**46**	**25**	**86**
Total	**52**	**137**	**47**	**236**

a. What is the probability that the student sits in the front of the class? *(4 pts)*
   i. Marginal Probability Conditional Probability Joint Probability
   ii. Calculate the probability.

b. If a professor randomly selects a female student, what is the probability that she sits at the front of the class? *(4 pts)*
   i. Marginal Probability Conditional Probability Joint Probability
   ii. Calculate the probability.

c. If a professor randomly selects a student sitting in the front of the class, what is the probability that the student is female? *(4 pts)*
   i. Marginal Probability Conditional Probability Joint Probability
   ii. Calculate the probability.

d. What is the probability that a student is a female who is sitting at the front of the class? In other words, what is the probability that a student sits at the front of the class and is a female? *(4 pts)*
   i. Marginal Probability Conditional Probability Joint Probability
   ii. Calculate the probability.

2. Two 5th grade teachers were planning on bringing treats in for their classes. They polled the classes on their sweet tooth preferences. The following table represents the data that was collected. *(18 points)*

	Chocolate sweets	**Non-chocolate sweets**	**Does not like any sweets**	**Total**
Boys	**24**	**13**	**3**	
Girls	**18**	**10**	**2**	
Total				

a) Please fill in the missing entries in the table.

b) Find the probability that a randomly selected student does not like any sweets.

c) Find the probability that a randomly selected student is a girl AND prefers non-chocolate sweets.

d) Find the probability that a randomly selected student prefers chocolate sweets OR does not like any sweets.

e) Find the probability that a randomly selected student prefers chocolate sweets given they are a boy.

f) Find the probability that a randomly selected student is a girl given they prefer chocolate sweets.

g) Are boys more likely to prefer chocolate than girls? EXPLAIN your answer by comparing probabilities.

3. The faculty at a college collected data on a multiple choice quiz over several years. Instructors gave different students the quiz. The quiz had five questions. *(16 points)*

Below is a probability distribution. This probability distribution displays the probability of getting a certain number of questions correct.

x	$P(x)$	$xP(x)$	$x-\mu$	$(x-\mu)^2$	$(x-\mu)^2P(x)$
1	0.02				
2	0.22				
3	0.35				
4	0.14				
5	0.06				

a) Find the probability a student selected at random got exactly 3 questions correct on the quiz.

b) Find the probability a student selected at random got exactly 3 OR exactly 5 questions correct on the quiz.

c) Find the probability a student selected at random got at least 3 questions correct on the quiz.

d) Find the standard deviation using the table/formula.

4. Ahmed wants to start his business with an ice cream truck. He offers 3 flavors of ice cream: chocolate, strawberry, and vanilla. The topping choices are cookie crumbs, sprinkles, and walnuts. Use a tree diagram to show how many total possible combinations Ahmed can sell. (10 points)

5. Please use the formula & show all work. (10 points)

   (a) There are 6 members on a board of directors. If they must elect a chairperson, a secretary, and a treasurer, how many different slates of candidates are possible?

   (b) There are 8 members on a board of directors. If they must form a subcommittee of 6 members, how many different subcommittees are possible?

6. The brand name of American Eagle Jeans has a 46% recognition rate at BHCC. An executive from the company wants to verify the recognition rate as the company is interested in opening more stores in the area. He selects a random sample of 8 BHCC students. Find the probability that exactly 4 of the 8 BHCC students recognize the American Eagle brand name. (15 points)

   a) Why is this a binomial distribution?

   b) Identify the following:

   n = p = q = r =

   c) Find the probability that exactly 4 of the 8 Coffleton residents recognize the brand name. **Please use the formula & show all work**.

7. In a study, 45% of adults questioned reported that their health was excellent. A researcher wishes to study the health of people living close to a nuclear power plant. Among 15 adults randomly selected from this area, only 3 reported that their health was excellent. (15 points) ****Please show all work**.

   a. Identify the following:

      n = p = q =

   b. Find the probability that when 15 adults are randomly selected, 2 or fewer are in excellent health. (Use Binomial Probability formula or table)

   c. Find the probability that when 15 adults are randomly selected, more than 2 are in excellent health. (Use Binomial Probability formula or table)

(EXTRA CREDIT)

1. A test consists of 10 true/false questions. To pass the test a student must answer at least 7 questions correctly. If a student guesses on each question, what is the probability that the student will pass the test?

2. In a research study, 97% of the 3850 Facebook users are adults. Find the mean and standard deviation for this distribution.

Mean for discrete probability distribution:

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

Standard Deviation for discrete probability distribution:

$$\sigma = \sqrt{\sum (x - \mu)^2 \cdot P(x)}$$

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:

$$\mu = np$$

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