MATH 422 Week 10 Quiz Name_____
Date_____

Directions: Answer each question to the best of your ability. **Show your reasoning** and/or process used to answer the question(s) where it is appropriate. A calculator will be helpful for this quiz. There are 5 questions.

Give your answers to probability questions as a fraction or decimal rounded to 3 decimal places

1. (3 pts) A retail bookstore raffle is created so that there will be 200 winners. Prizes are selected from a barrel of plastic eggs. Open the egg and the prize is inside. 150 eggs contain the prize "10% discount" on any regularly priced item in the store. 45 eggs contain the prize "25% discount". 4 eggs contain the prize "2 for 1" of equal value books. 1 egg contains the prize "1 free book per month for a year".

Each time a winner takes an egg, it is not put back into the barrel. What is the probability that Reyes will get the 25% discount after the first winner picked the 10% discount?

2. (3 pts) A professor teaches two sections of the same course. Here is a summary of students, and their grades on the most recent exam by section:

	A	B	C	Total
Morning class:	11	9	18	38
Afternoon class:	20	3	6	29
Total	31	12	24	67

If two students are selected at random, what is the probability that they both got an A on the exam?

3. (3 pts) Using the same information as in problem #2, if ONE student is selected at random, what is the probability that the student got a "B" **given that** student is in the morning class?

4. (3 pts) A bag contains 1 gold marble, 5 silver marbles, and 22 black marbles. Someone is 'selling' the following game to a crowd of onlookers: You (the player) randomly select one marble from the bag. If it is gold, you win $6. If it is silver, you win $3. If it is black, you lose $1.

What is the expected value if you play this game?

5. (3 pts) A company estimates that 3% of their products will fail after the original warranty period but within 2 years of the purchase, with a replacement cost of $800. [Hint: There are two outcomes for x: needs replacement, and does not need replacement]

If they offer a 2 year extended warranty for $30, what is the company's expected value of each warranty sold?

Formulas:

Conditional Probability: Two events, or two observations from a single event which are dependent (the success of one impacts the success of the other)

When you see written Pr $(B|A)$ this means "the probability of B given A"; in other words, it's the new probability of B occurring after A has already happened or been observed.

$$\Pr(\text{A and B}) = \text{P(A)} * \text{P(B|A)} \quad \text{or} \quad \Pr(\text{B|A}) = \Pr(\text{A and B}) \div \Pr(\text{A})$$

Expected Value: Given a sample space of ***n*** outcomes (**x**) and their probabilities – **Pr(x)**, the "expected value" of this event or observation is given by:

$$E(x) = x_1 \cdot \Pr(x_1) + x_2 \cdot \Pr(x_2) + \cdots + x_n \cdot \Pr(x_n)$$

Some other useful formulas:

Complementary events rule: $\Pr(\text{A}) = 1 - \Pr(\text{A}^c)$ -or- $\Pr(\text{A}^c) = 1 - \Pr(\text{A})$

Two independent events: $\Pr(\text{A and B}) = \Pr(\text{A}) * \Pr(\text{B})$

$\Pr(\text{A or B}) = \Pr(\text{A}) + \Pr(\text{B}) - \Pr(\text{A and B})$