**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 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(A and B) = P(A) P(B|A) or Pr(B|A) = Pr(A and B)Pr(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:

Some other useful formulas:

Complementary events rule: Pr(A) = 1 – Pr(Ac) -or- Pr(Ac) = 1 – Pr(A)

Two independent events: Pr(A and B) = Pr(A) Pr(B)

Pr(A or B) = Pr(A) + Pr(B) – Pr(A and B)