STT 861 (Fall 2019): Homework 2

This homework will be collected at the start of the lecture of **Monday Sep 23, 2019**.

Question 1. You are given $P(A \cup B) = 0.7$, and $P(A \cup B^c) = 0.9$. Calculate $P(A)$.

Question 2. An insurer offers a health plan to the employees of a large company. As part of this plan, the individual employees may choose exactly two of the supplementary coverages A, B, and C, or they may choose no supplementary coverage. The proportions of the company?s employees that choose coverages A, B, and C are 0.25, 0.3, and 0.5 respectively. Calculate the probability that a randomly chosen employee will choose no supplementary coverage.

Question 3. There are 8 members in a students' club – 4 girls and 4 boys.

(a) All the members are sitting in a row for a photoshoot. If they have selected their seats randomly, what is the probability that no two boys and no two girls will be sitting next to each other?

(b) What is the chance that the girl named Anne will be sitting next to the boy named Boris if the memebers have selected their seats randomly?

(c) Three students are selected at random to represent their quiz team. Find the chance that the quiz team will have at least two girls.

(d) Suppose the members were selected sequentially to form the quiz team of 3 students. If the first selected student is a girl, what is the probability that the quiz team will have at least one boy?

(e) Suppose a committee consisting of 2 girls and 2 boys are to be formed and the the committee members are selected randomly. But Anne and Boris are feuding and do not want to serve together in the committee (if both are selected). So if both are selected, the committee has to be disbanded and a new selection will be tried. Given a committee is formed what is the probability that it is not represented by Anne?

Question 4. An urn contains 10 balls: 4 red and 6 blue. A second urn contains 16 red balls and an unknown number of blue balls. A single ball is drawn from each urn. The probability that both balls are the same color is 0.44. Calculate the number of blue balls in the second urn.

Question 5. A production facility employ 12 workers on the day shift, 8 workers on swing shift and 5 workers on the graveyard shift. A quality control consultant is to make a random selection of 4 of those workers (without replacement) for in-depth interviews.

(a) What is the probability that all 4 workers will be from the same shift?

(b) What is the probability that at least two different shifts will be represented among selected workers?

(c) What is the probability that exactly one of the shifts will not be represented in the sample of selected workers?

Question 6. A health study tracked a group of persons for five years. At the beginning of the study, 20% were classified as heavy smokers, 30% as light smokers, and 50% as nonsmokers. Results of the study showed that light smokers were twice as likely as nonsmokers to die during the five-year study, but only half as likely as heavy smokers. A randomly selected participant from the study died during the five-year period. Calculate the probability that the participant was a heavy smoker.

Question 7. An insurance company sells auto and home insurance only. An auditor found the following information about the company:

- 90% of the clients have bought auto insurance,
- 70% of the clients have bought home insurance,
- 45% clients have filed for some claims,
- 60% of those who bought only auto insurance have filed for some claims,
- among those who bought only home insurance 30% have filed for some claims.

If a client is arbitrarily selected did not file for any claim, what is the probability that the client has bought both auto and home insurance?

Question 8. In a quiz there are three multiple choice questions. Qn1 has 3 choices, Qn2 has 5 choices, and Qn3 has 4 choices - for each question only one choice is the correct answer. A student, who came to the quiz completely unprepared, decided to select a choice randomly for each question. The choices she made for Qn1, Qn2 and Qn3 are independent of each other. What is the chance that she got exactly one correct?

Question 9. Solve 1.24 from the textbook.

Question 10. Solve 1.38 from the textbook.