MATH 233 Fall 2018 Midterm Exam

Remarks: Show your work. Do not just write a number or a formula as the result.
Duration is 90 minutes and all questions are worth 20 pts.

1. In a sport shop, there are T-shirts of 5 different colors, shorts of 4 different colors, and socks of 3 different colors and shoes of 2 different colors. How many different uniforms can you compose from these items?

2. On a ticket for a **soccer sweepstake**, you have to guess 1, 2, or X for each of 13 games. How many different ways can you fill out the ticket?

3. From a class of 24 students, a comittee of **five students** are going to be choosen randomly to represent the class.

   A. In how many ways can this five-student committee be formed?

   B. One of the students in the class is Haydar Pekgül. What is the **probability** that Haydar Pekgül is in that committee?

   C. Assume another student in the class is Ela Sel. What is the **probability** that both Haydar Pekgül and Ela Sel **are both** in the chosen five-student committee?

4. A string that contain only 0s, 1s and 2s is called a **ternary string**. For example, 10220101 is a ternary string and so are 0102, 221, 0101 and 11.

   A. Find a **recurrence relation** for the number of ternary strings of length n that do NOT contain consecutive 0s, 1s or 2s.

   B. What are the **initial conditions**?

   C. How many ternary strings of length 16 do NOT contain consecutive 0s, 1s or 2s?

5. We roll a dice twice.

   a) What is the **experiment?**

   b) What is the **sample space**?

   c) What is the **size** of the sample space?

   d) Consider the event E_{even_sum} that corresponds to getting an even number as the sum of two dice. What is the **probability** of this event?

   e) Assume along with the two dice, we also toss a coin. What is the **probability** of E_{even_sum} if we know that the coin showed a tail?

   f) Assume along with the two dice, we also toss a coin. What is the **probability** of E_{even_sum} if we know that one of the dice shows a 2?