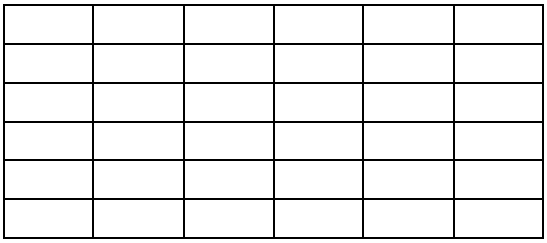
Çankaya University Computer Engineering Department Graduate Programs Entrance Exam

Academic Year 2020-2021
Exam Date: September 22, 2020

1. **Programming**
   Assume a function named NonUniformProb() generates random integers between 1 and 6 (inclusive). The integers are generated with different probabilities and the function accepts these probabilities as an argument. For instance, if the probabilities are given as [0.1, 0.2, 0.05, 0.1, 0.3, 0.25], the probability that the function returns 1 is 0.1 and the probability of getting from the function 6 is 0.25.
   Assuming rand() which returns random numbers between 0 and 1 is available, implement NonUniformProb()
   Use C or C++ in your program and do not use any library function except rand()

2. **Discrete Mathematics**
   An artist uses tiles with 5 different patterns to fill in a matrix of 6 by 6 as shown below. How many distinguished sequences of tiles can he obtain on the main diagonal of the matrix. Assume he has enough tiles of each pattern.



3. **Databases**
   The following tables have been given
   Student: <StID, Name, Program>
   Course: <Code, CName, Credit>
   Result: <StID, Code, Year, Grade>
   Write a SQL query to determine the names of the students who passed "Database" course with a grade larger than the average in year 2015.
   Hint: The minimum grade to pass the exam is 50

4. **Operating Systems**
   The following jobs arrive at a system for execution. Find the average turn around time if the scheduling algorithm is
   - Round Robin
   - Shortest remaining time first

Elaborate on the differences in the results

Job ID	Arrival Time	Duration
T1	0	10
T2	3	6
T3	4	8
T4	5	4

Hint: assume quantum = 1

5. Algorithms

Using Kruskal's algorithm convert the following graph to its corresponding minimum spanning tree. Show how the tree is created according to the algorithm.

What is the most time-consuming operation in Kruskal's algorithm?