CSE 207 (Data Structures and Algorithms II)
Class Test 1 (Jan 22, 2022)   Time: 25 minutes

Name: _____   **Std No:** _____

Q. 1 (3+3 = 6 pts)
Dr. MSB is teaching a class of 56 students. Two of them could not attend a class test due to illness. Dr. MSB has inserted the IDs of the students who attended the test into a hash table of size 60. Assume that Dr. MSB is using open addressing with linear probing. Considering the current state of his hash table, answer the following questions.

   i) Give an upper bound on the expected number of probes in an unsuccessful search.
   ii) What is the probability that i probes will be required to find an empty slot?

Q. 2 (3+3 = 6 pts)
(a) Assume that you are working with a hash table of size 11 and 5 keys already stored. You want to insert a new element to the hash table using quadratic probing.

i) What is the probability that the first probe will be unsuccessful?
ii) What is the probability that the element will be inserted within the first 6 probes?

Q.3 (8 pts)
Consider inserting the keys 10, 22, 31, 4, 15, 28, 16, 17 and 59 into a hash table of size $m = 11$ using open addressing with hash function $h(k) = k \bmod m$. Illustrate the result of inserting these keys using linear probing and quadratic probing. You don't need to show the intermediate steps, just show the hash tables (one for linear probing and another one for quadratic probing) after inserting all the elements. How many primary clusters do you observe in your hash table with linear probing?