Problem 9: Implementation and Application of Hashing

Data Structures Lab (CS111)

In this assignment, you need to do the following tasks:

1. Ask user to provide a prime number P. Create two hash tables of size P. Populate both the hash tables using the hash function $h(key) = (key)\, mod\, P$. You need to do collision resolution in one hash table using chaining. In the other hash table you need to use linear probing for collision resolution. Generate a random sequence of numbers (using $rand()$ or $srand()$ function) and insert in both the hash tables. Compare the number of collisions. **[10 marks]**

2. Let A and B are two friends playing a game. In each round of the game A first generates an array of integers a (both positive and negative). Then B provides one integer b without knowing the elements in the array a. If there is a sub-array of a such that the sum of the elements is equal to b, then B is the winner. Otherwise A becomes the winner of the game of that round. You need to provide a hash table based implementation of this game. You need to use both implementations of the hash table and compare the number of collisions in both approaches. For example: if A generates the array $\{2, 6, 0, 9, 7, 3, 1, 4, 1, 10\}$ and B enters 15, then B is the winner. You need to return $\{6, 0, 9\}$ also. If B enters 12, then A is the winner. **[5 marks]**