Worksheet 2: Hash Maps

The goal of this worksheet is to get experience of how HashMaps work. In the course, we explored 2 collision handling strategies: *seperate chaining* and *open addressing*. For open addressing, we explored 2 probing strategies: linear probing and double hashing. You are required to show how a standard set of entries would be inserted into a hash table using each of the collision handling strategies mentioned above.

You are asked to create a Hash Map to store entries that map international dialing code extensions to country names.

353	"Ireland"
44	"United Kingdom
33	"France"
1	"United States of America"
49	"Germany"
679	"Fiji"
253	"Djibouti"
269	"Comoros"
61	"Christmas Island"
86	"China"

For each of the following hash tables, show how the state of the hash table would change following the inserting of each of the above entries (you can assime that the country code is an integer, and also only need to show keys in your answer). You can submit your work by hand (pen and paper) or by electronic document (word or excel will be accepted). **Please submit questions 7, 8, 9.**

1. Create a hash map using an array of size 11, the seperate chaining collision handling strategy and the following hash function:
   $h(k) = (3*k + 2) \% 11$

2. Create a hash map using an array of size 11, the linear probing collision handling strategy and the following hash function:
   $h(k) = (3*k + 2) \% 11$

3. Create a hash map using an array of size 11, the double hashing collision handling strategy and the following hash functions:
   $h(k) = (3*k + 2) \% 11$
   $d(k) = 7 - k \% 7$

4. Create a hash map using an array of size 17, the seperate chaining collision handling strategy and the following hash function:
   $h(k) = k \% 17$

5. Create a hash map using an array of size 17, the linear probing collision handling strategy and the following hash function:
   $h(k) = k \% 17$

6. Create a hash map using an array of size 17, the double hashing collision handling strategy and the following hash functions:

$h(k) = k \% 17$
$d(k) = 11 - k \% 11$

7. Create a hash map using an array of size 13, the seperate chaining collision handling strategy and the following hash function:

$h(k) = (k + 5) \% 13$

8. Create a hash map using an array of size 13, the linear probing collision handling strategy and the following hash function:

$h(k) = (k + 5) \% 13$

9. Create a hash map using an array of size 13, the double hashing collision handling strategy and the following hash functions:

$h(k) = (k + 5) \% 13$
$d(k) = 5 - k \% 5$