PROGRAMMING CHALLENGE 7: HASH TABLE

Customers are identified by ID numbers. These ID numbers are to be stored in a hash table. The hashing function to be used is

```
Address ← IDnumber MOD Max
```

The hash table is implemented as a one-dimensional array with elements index `0` to `(Max - 1)`.

Task 1
Write program code to:

- Read ID numbers from a text file and store them in a hash table. For the purpose of testing the program, `Max` is to be set to the value of 20.
  Assume different IDs will hash to different addresses (no collisions).
- Print out the contents of the hash table in the order in which the elements are stored in the array.

Use `KEYS1.txt` to test your program code.

Evidence 1
Your program code.
Screenshot of the program output. **[7]**

Task 2
Amend your program code so that collisions can be managed using open hashing. This means a collision is resolved by searching sequentially from the hashed address for an empty location and storing the ID at this empty location.

Use `KEYS2.txt` to test your program code.

Evidence 2
Your program code.
Screenshot of the program output. **[4]**

Task 3
Add code to your Task 2 program. The program is to:

- Take as input an ID number
- Search the hash table and output the address (index number) of the hash table where the ID was found.

Use `KEYS2.txt` to test your program code.
Run the program three times. Use the following inputs: 37, 77 and 97.

Evidence 3
Your program code.
Screenshot of the program output. **[7]**