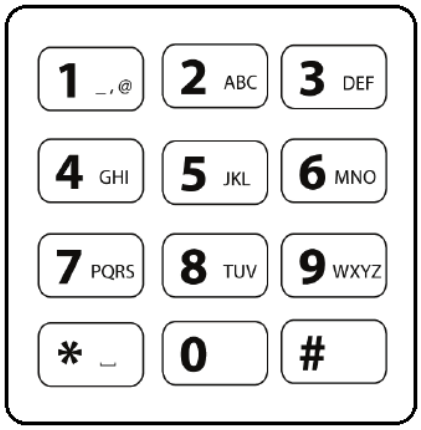
CS218 Data Structures

Spring 2020 FAST-NU, Lahore

Assignment 4 – Recursion

Question 1. Given a sequence of numbers from a mobile keypad, write a recursive function to print all possible combinations of words formed from the letters written on the corresponding keys.



Input format:

- User can input any number in the range 2-9 inclusive
- User can enter minimum of 2 numbers and maximum of 8 numbers

A sample run of this program is given below:

```
Input: 3  4  8

//Output

DGT   DGU   DGV   DHT   DHU   DHV   DIT   DIU   DIV
EGT   EGU   EGV   EHT   EHU   EHV   EIT   EIU   EIV
FGT   FGU   FGV   FHT   FHU   FHV   FIT   FIU   FIV
```

Question 2. Given an array of integers, replace every element with the product of all other elements of the array.

i. First, provide an iterative solution
ii. After that, design a recursive solution

A sample run of this program is given below:

```
Input: 5  4  3  2  1

Output: 24  30  40  60  120
```

Question 3. Provide a recursive function that takes a pointer to the middle of an infinite doubly linked list along with an integer key and searches the list for the given key. The list grows infinitely in both directions. Your algorithm should be able to find the key if it is present in the list, otherwise it should continue the search infinitely.

Question 4. Write a recursive function to check whether a string is a K-Palindrome or not. A string is a K-Palindrome if it becomes a palindrome after removing at most K characters from it.

A sample run of this program is given below:

```
Input string: ABCDEFDCBA
K: 1

Output: Yes

Input string: XYZUVX
K: 2

Output: No
```

In the first case, you can remove either E or F from the string and the resultant string will be a palindrome. In the second case, you can never get a palindrome by removing at most 2 characters from the string.