Programming I (Python)
Assignment 5

1 Mathematical Functions

1. Implement a function `hello(name)` that returns a string with "Hello " as prefix to name. (name is a string input.)

   Example:

```
$ python hello.py
Hello IIITB
```

2. Implement a function `double(l)` that takes an input list `l` and returns a list doubling every element of `l`. Use list comprehension to achieve this.

   Example:

```
$ python double.py
input =  [1, 2, 3]
[2, 4, 6]
```

3. 3. Implement a function `even_elements(l)` that takes an input list `l` and returns a list only even elements from `l`. Use list comprehension to achieve this.

   Example:

```
$ python even.py
input =  [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
[0, 2, 4, 6, 8]
```

2 Recursion

4. Write a recursive function `sumDigits(`n`)`to calculate the sum of all the digits of n.

   Example:

```
$ python sum_of_digits.py
Enter number: 123
6
```

5. Given a function `decToBin(n)` that returns the binary equivalent of the number n. `decToBin`makes use of another function `recurse(ans, n)` which implements the decimal to binary conversion using recursion. Implement `recurse`. Example:

```
$ python dec_to_bin.py
Enter number: 12
1100
```

6. Given a function `isPalindrome(n)` that checks whether a given number (or string) is a palindrome or not. `isPalindrome` makes use of another function `recurse(n, i)` which implements actual check using recursion. Implement `recurse`.

   Example:

```
$ python palindrome.py
Enter number: 121
True
```

7. Write a recursive solution to calculate the factorial of a number.

   Example:

```
$ python factorial.py
Enter number: 12
479001600
```

8. You are given a function `printSeq(n, k)` that takes 2 integers as inputs: n and k. The goal is to print all sequences of k-length, where the elements of the sequences are from first n natural numbers, and the digits in the k sequence are increasing, that is digit at k^{th} is greater than the digit at $(k-1)^{th}$ position.

   `printSeq` makes use of another function `printSeqUtil(n, k, len1, arr)` which does the actual work of printing the sequences; `printSeqUtil` is recursive.

   Example:

```
$ python sequence.py
Enter n: 5
Enter k: 3
1  2  3
1  2  4
1  2  5
1  3  4
1  3  5
1  4  5
2  3  4
2  3  5
2  4  5
3  4  5
```

The following questions are just for practice, in case you were not able to do them in the lab. They will not be graded.

9. Write a function to find minimum and maximum element in a list using recursion.
10. Print a list in reverse using recursion.
11. Find the sum of first N natural numbers using recursion.
12. Given a number n, find whether it is prime or not, using Recursion.