Computing for mathematics handout 3 - Functions, Lists and For Loops, Iteration versus Recursion

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What you have learnt this week:

- Lists, appending variables to lists, using list comprehensions;
- Dictionaries;
- Writing and reading data to file;
- Recursion versus iteration.

Functions

- When you define a function you do not **use** it:

```
def mean(lst):
    """
    A function to return the mean of a list

    Arguments:
        lst: A list of numbers

    Outputs: The mean
    """
    sumofelements = sum(lst)
    N = len(lst)
    return lst / float(N)
```

- The above just creates a **tool** that we can use if we want to:

```
print mean([1,2,3,4,5])
```

Lists and for loops

- A list is a python object that **contains** other python objects:

```
someoddnbrs = [1,3,5,7,9,11]
```

- We can use a for loop (see sheet 1) to 'iterate' (ie 'go through') the elements of that list:

```
for k in someoddnbrs:
    print k
```

- We can apply a function to a list:

```
def makeeven(k):
    """
    A function to minus 1 from a number

    Arguments:
```

```
        k:  an  odd  number

Output :
        k  −  1
"""
return  k  −  1

someevennbrs  =  [ ]
for  k  in  someoddnbrs :
    someevenbrs . append ( makeeven ( k ) )
    print  someevennbrs
```

- We can do this in 1 line using list comprehensions:

```
someevennbrs  =  [ makeeven ( k )  for  k  in  someoddnbrs ]
```

Iteration versus recursion

- Iteration is an approach for defining a function that loops through elements.

- Recursion is an approach for defining a function that 'calls itself' until a base case is reached.

What you should do next:

- You have had a lot of information delivered to you in a short amount of time, go back through the previous sheets to make sure you understand the basics.

- **Get started on the third sheet!**

- To make the best use of the lab sessions turn up having finished your sheets;

- If anything is still unclear **please** come and see me during office hours.