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

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**Office hours: Thursday 1300-1500**

## 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.