Week 4 - Sorting and Searching Algorithms

This lab sheet will introduce two algorithms from computer science. After this session you will be able to sort and search lists using the two following algorithms:

- Insertion and Bubble sort algorithm;
- Binary search.

Sorting Algorithms

1. **TICKABLE** The following code create a list of digits from 1 to 31.

   ```
   l = range(1, 31)
   print l
   ```

   If we import the random library we can pick a random sample of the list and `shuffle` this it (do not worry too much about this):

   ```
   import random
   jumbledlist = random.sample(range(1, 31), 20)
   random.shuffle(jumbledlist)
   print jumbledlist
   ```

   Using pen and paper, sort the above list, attempting to understand a general approach to doing this. Write a function `jumbledlist` that takes as arguments: `maximumnumber` and `sizeoflist` which returns a jumbled list of integersas above.

2. **TICKABLE** Python has a built in method on lists to sort them: `sort()`:

   ```
   l = jumbledlist(30, 20) # Use the function you created above.
   print l
   l.sort()
   print l
   ```

   In this question we will take a look at one type of algorithm that can be used to sort a list: "Selection sort".

   IDEA (WITH PICTURE) PSEUDOCODE CODE

3. Pseudo code for bubble sort asking student to code it themselves.

4. Timeing module to compare both of the above algorithms on a series of data files...

Searching algorithms

5. **TICKABLE** Search a list by hand.
6. **TICKABLE** Code for iterative binary search.
7. Code for recursive binary search.