Exercise 1

You are given an array $A[\,]$ of n <u>positive</u> integers, and a target sum t (again a positive integer). Your task is to find a non-empty sub-array $A[i\ldots j]$ such that

$$t = A[i] + A[i+1] + \ldots + A[j],$$

or report that no such sub-array exists. Write an O(n)-time program to solve this problem.

Sample output

```
n = 20
t = 50
7  4  2  7  7  4  1  2  6  5  4  7  9  3  7  1  6  6  5  8
+++ Subarray found...
50 = 2 + 6 + 5 + 4 + 7 + 9 + 3 + 7 + 1 + 6
```

Exercise 2

You are given two linked lists A and B which may or may not contain a common node. From the first common node (if any) in A and B, the two lists are the same until the end. The two lists in presence of a common node looks like the Roman letter **Y**.

Part (a)

Read the total number t of nodes in the lists A and B from the user. Create the two lists together as follows:

```
while (a total of t nodes are not added) {
        Create a new node with randomly generated data;
        If the two lists are already merged, append this new node to the merged part, and continue;
        Make a random decision whether the two lists are to be merged at this new node;
        If so, merge the two lists, and continue;
        Append the new node to one of the two lists (each with probability half);
}
```

Print the two lists individually.

Part (b)

Write a function to print the lists together. You pass only the two list headers as parameters to your function. The function first prints the elements of A before the first common node. It then prints the elements of B before the first common node. Finally, the nodes common to both the lists are printed. Your function should run in O(t) time and use only O(1) additional space. Your function must not make any change to the lists A and B.

Sample Output

```
t = 20

+++ Part(a)
List A          : 832 494 318 17 23 569 389 298 488 19 144 849
List B          : 225 262 188 637 353 605 300 589 23 569 389 298 488 19 144 849

+++ Part(b)
Initial part of A : 832 494 318 17
Initial part of B : 225 262 188 637 353 605 300 589
Common part       : 23 569 389 298 488 19
```

Submit two files *subarray.c* and *Y.c* solving the two exercises separately.