# INFO216
## Imperative Programming II

**Lebanese University**
**Faculty of Sciences 1**

## Part I: Independent Questions

**1.** Write a function that determines whether a singly-linked list of real numbers is circular or not. It is forbidden to modify the content of the list. (10 points)

**2.** Write a function that returns the contents of the $n^{th}$ element from the tail of a noncircular linked list of integers, where 0 is the order of the last element (tail) of the list. Only one scan of the list is permitted. (15 points).

head                          2nd from the tail
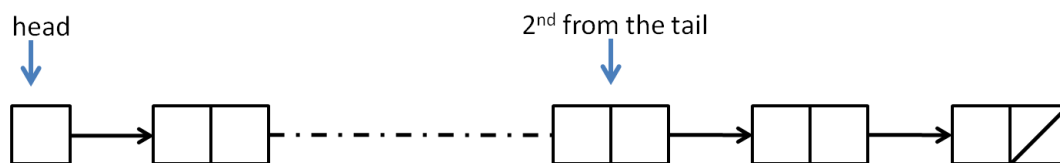


## Part II: Run-Length Encoding

The run-length encoding (RLE) is to replace the range of values, of a given list, by the couple {length, value} as shown in the example:

List:           120, 120, 120, 200, 100,100, 111, 111, 111, 111, 100, 100, 100

RLE Form:      {3,120}, {1,200}, {2,100}, {4,111}, {3,100}

**3.** Define the necessary data type(s). (4 points)

**4.** Write the function "encode" which, from a singly-linked list of integers, stores in a binary file its RLE form and frees the list memory. (12 points)

**5.** Write the function "decode" which does the reverse of the previous function, that is to say, from a binary file containing the RLE representation, rebuilds the list of integers. (12 points)

**The End**