Mila University Center

Institute of Science and Technology
2nd ^{year} L MD computer science
ASDD1 Module

TD Series N 03
Stacks and Queues

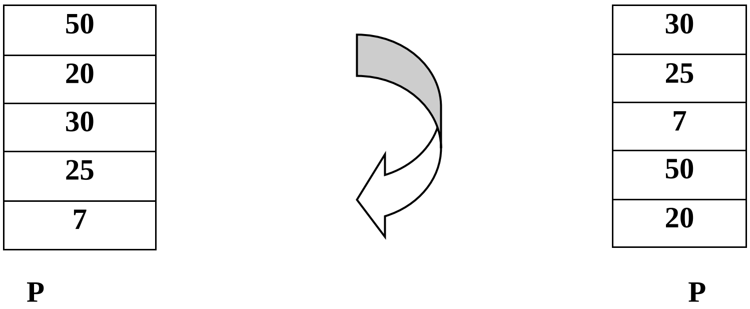
Exercise 01: give the declaration of a dynamic stack of integers and write algorithmically the operations allowing us to create a stack of N integers, to display its even elements and to calculate the sum of its elements. Use directly stack primitive operations (is_empty, Push, Pop, Top, Size).

Exercise 02: Repeat exercise 1 for a dynamic queue of integers. Use directly queue primitive operations (is_empty, Enqueue, Dequeue, Head, Size).

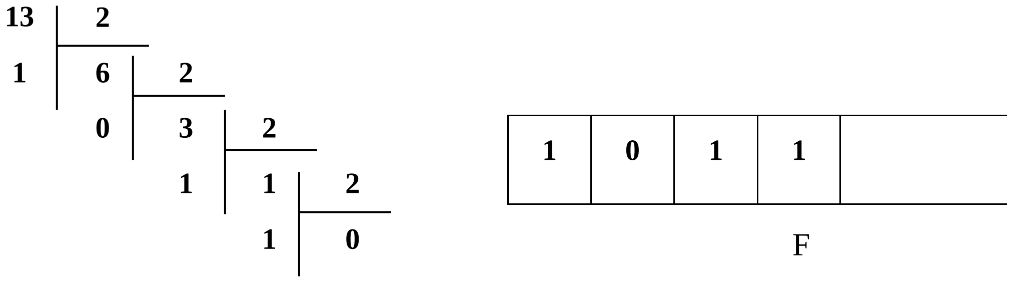
Exercise 03: Using a stack and its primitives, write the function copy (L) that allows creating a copy of the linked list L.

Exercise 04 (circular permutations): write a function **permutation_circ** which receives as an argument a stack P and an integer N (N ≤ Size(P)) and performs N successive circular permutations on the stack.

Example with N=2:



Exercise 05: in the example below, row F contains the binary representation of the number 13 (1101).



1. *binary* procedure that receives a decimal number *x* and creates a File F containing its binary representation.
2. *decimal* function that receives a File F containing the binary representation of an integer *x* and returns its decimal representation.

Exercise 06: We want to implement a program to calculate the approximate printing time of a set of documents threaded into a printer queue. This queue is implemented by a linked list (dynamic queue) where each link contains the name of a document with the number of pages to print.

1) Define the data types needed for the implementation of this queue.
2) Write the function that returns the number of documents exist in the queue.
3) If the time to print one page is 5 seconds, write the procedure that displays the time required to print all documents.

Exercise 07: additional

Using a stack, write an iterative version for the recursive function power(x, n) respecting the algorithm of its execution by programming languages.

```
int powerful(int x, int n)
{ if (n==)
        return 1;
else
        return x * power(x, n-1);
}
```

Exercise 08: additional

Repeat exercise 6, considering that each document in the queue is represented by a document name and a queue of pages to print.

Exercise 9: additional

Using a stack, write the function to evaluate a post-fixed arithmetic expression, represented by a linked list, containing only digits (0,1,…9) as operands and the following operators: addition '+', subtraction '-', multiplication '*', and division '/'.

Example: 2 3 * 8 +