Alexandria University
Faculty of Engineering
Specialized Scientific Programs
Computer & Communication Program
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Data Structures (1)
Course Code: CSE127
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Lab 04
Linked Lists

1. Consider the following structs that represent node and linked list with two pointers for head and tail.

```
typedef struct {
    int data;
    struct Node *next;
}Node;
typedef struct{
    node *head;
}LinkedList;
```

Write a C program that contains the following functions (linked list operations) on a linked list containing n integer elements.

- **LinkedList* initialize ()**
- **void insertAtBeginning (LinkedList *l, int x)**
- **void insertAtEnd (LinkedList *l, int x)**
- **void deleteFromBegining (LinkedList *l)**
- **void deleteFromEnd (LinkedList *l)**
- **void displayList (LinkedList *l)**

HOMEWORK PROBLEMS

1- Write a C function that search for a given value in LinkedList and return pointer to the node containing that value or NULL if the value is not found.

```
Node* search(LinkedList*list, int value);
```

2- Write a C function that inserts a value at specific index.

```
void insert(LinkedList*list, int index, int value);
```

Notes:

- Index should be zero based, so 0 means insert at beginning.
- Make sure to handle the special cases when index is out of bounds → print invalid index.
- In case of insertion at the beginning , the head node must be updated accordingly.

3- Write a C function to check if given two lists are identical or not.

```
int identical (LinkedList*x, LinkedList*y);
```

4- Write a C function to merge two given **sorted** single linked lists into one single **sorted** linked list.

```
LinkedList* merge (LinkedList*x, LinkedList*y);
```

5- Write a C function to return the intersection between two given **sorted** single linked lists.

```
LinkedList* intersection(LinkedList*x, LinkedList*y);
```

6- Write a main function that displays a menu, allowing the user to select which function to test. Prompt the user for the corresponding input based on the chosen function. Include an additional option to exit the program.

Notes:

- You are allowed to use the functions that are implemented in the labs.
- You must **upload one file** that contains all the functions, and the 5 functions required and the main function that displays the output of all required functions.