The Ministry of Higher Education and Scientific Research		**Subject: ECE211 Comp. Prog III** **Year: Second**
The University of Kufa **College of Engineering**		**Date: Dec 3rd, 2024** **Exam Duration: 120 min**
The Department of Electronic and Communications Engineering		**Examiner: Dr Wahhab Mousa** **Midterm Exam (D)**

Notes: (1) Answer four questions; (2) Use ONLY English; and (3) No electronics or internet.

Student's Name (in Arabic):

Q1: (25 Marks)
A stack data structure is implemented with an array. Suggest necessary steps to divide the stack into two parts. The size of the first part is determined by a user input $x > 0$. Note: you may utilize any number of stacks to implement for this operation.

Q2: (25 Marks)
Assume the following strings A[]="ECE211 Computer Programming III", and B[]="ECE206 Combinational Logic Circuits". Write a C program that compares the two strings and inserts the results in a linked list as follows: (1) it inserts 'x' in the linked list if both characters are different; (2) inserts the same char if both characters are identical.

Q3: (25 Marks)
Write a C program that merges two arrays in one stack.

Q4: (25 Marks)
Write a C code program that prints '*' character as shown in figure below.

```
*           *
**         **
***       ***
****     ****
***** *****
**********
```

Q5: (25 Marks)
(A) Circle all suitable answers:
1- In C, the 'if' statement needs an 'else' statement. (always, sometimes, true, false).
2- A switch statement can be substituted by if statements. (always, sometimes, true, false).
3- To merge two linked lists into a new list, the time complexity is $O(1)$. (always, sometimes, true, false).
(B) Answer two of the following by explaining the required steps:
(1) Delete a node from a queue (implemented with a linked list). (2) Push an item on a stack (implemented with an array). (3) Search a stack for an element.
