UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT

Data Structure and Algorithm

Laboratory Activity No. 8

Stacks

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I. Objectives

Introduction

A stack is a collection of objects that are inserted and removed according to the last-in, first-out (LIFO) principle.

A user may insert objects into a stack at any time, but may only access or remove the most recently inserted object that remains (at the so-called “top” of the stack)

This laboratory activity aims to implement the principles and techniques in:

- Writing Python program using Stack
- Writing a Python program that will implement Stack operations

II. Methods

Instruction: Type the python codes below in your Colab. After running your codes, answer the questions below.

```
# Stack implementation in python


# Creating a stack
def create_stack():
    stack = []
    return stack


# Creating an empty stack
def is_empty(stack):
    return len(stack) == 0

# Adding items into the stack
def push(stack, item):
    stack.append(item)
    print("Pushed Element: " + item)

# Removing an element from the stack
def pop(stack):
    if (is_empty(stack)):
        return "The stack is empty"
    return stack.pop()

stack = create_stack()
push(stack, str(1))
push(stack, str(2))
push(stack, str(3))
push(stack, str(4))
push(stack, str(5))

print("The elements in the stack are:"+ str(stack))
```

Answer the following questions:

1 Upon typing the codes, what is the name of the abstract data type? How is it implemented?
2 What is the output of the codes?
3 If you want to type additional codes, what will be the statement to pop 3 elements from the top of the stack?
4 If you will revise the codes, what will be the statement to determine the length of the stack? (Note: You may add additional methods to count the no. of elements in the stack)

III. Results

Answer 1:

The name of the abstract data type is Stack, It is implemented by creating the "create_stack()" function to initialize the container of the elements for the stack, "is_empty(stack)" function is used to determine if the length of the stack is equal to 0. The "push(stack, item)" function used for pushing elements into the stack. The "pop(stack)" function is used to remove elements in the stack.

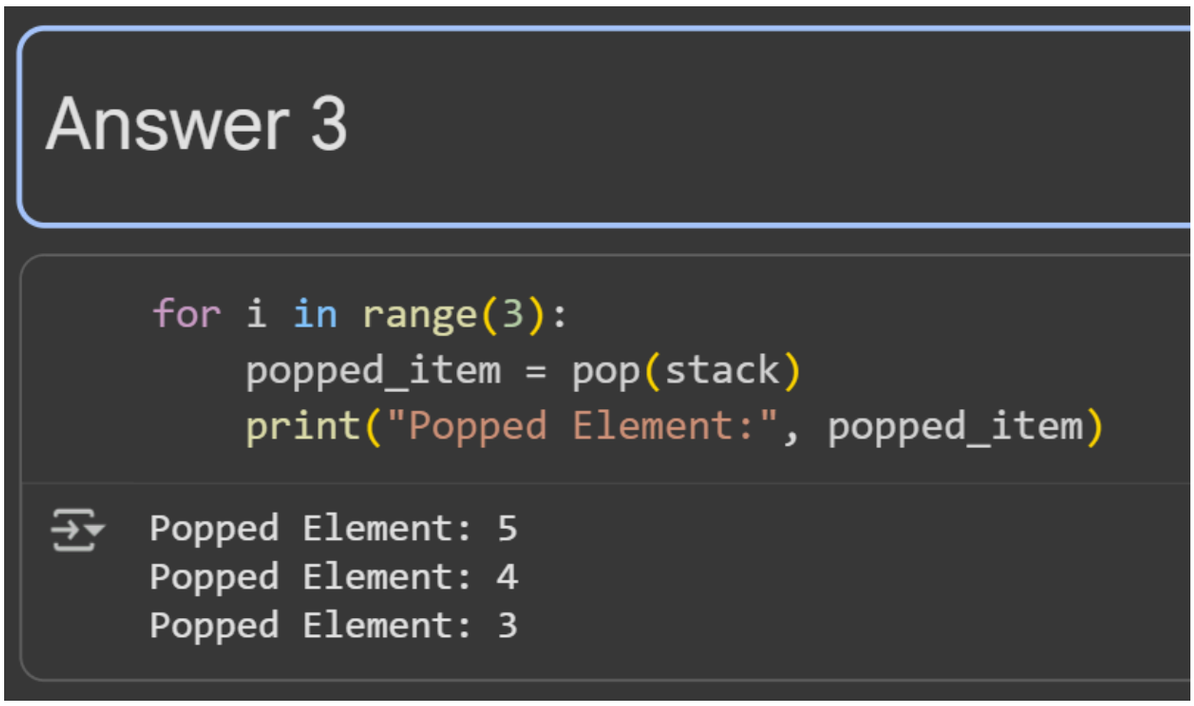
Answer 2:

```
Pushed Element: 1
Pushed Element: 2
Pushed Element: 3
Pushed Element: 4
Pushed Element: 5
The elements in the stack are:['1', '2', '3', '4', '5']
```

Figure 1: Output the Code

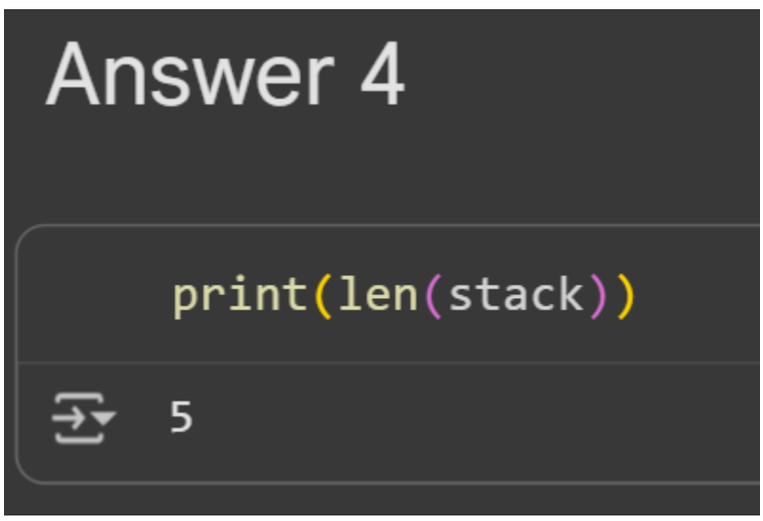
The elements are added in "LIFO" manner, as the structure of stacks implies.

Answer 3:



Instead of copy pasting the three pop(stack) i've instead made a for loop that has a range of 3 which will repeat the pop(stack) three times, not needing to copy and paste the same pop(stack).

Answer 4:



Determining the length of the Stack fairly straightforward, we just need to use the len() function in the code.

IV. Conclusion

In conclusion, stack is just one of the tools in constructing a more efficient program, being able to utilize and master this Data Structure can help you create efficient Algorithms.

References

[1] “Python program to implement stack using list,” GeeksforGeeks, https://www.geeksforgeeks.org/stack-in-python/ (accessed Oct. 11, 2025).

[2] M. A. Weiss, *Data Structures and Algorithm Analysis in Python*, 2nd ed., Pearson, 2020.