

COMPUTER SCIENCE AND DA

Data Structures through Python

Stack

Lecture No. 01



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TOPICS TO BE COVERED



1) Mult-Dimensional Array

2) Problem.



STACK



Stack is a linear data structure which follows

LIFO (Last In First Out) principle

LIFO: The element which has been added in the last is the first one to be removed.

stack of plates



In stack always the operation is performed only at one end of the stack and that is known as top of the stack.

1, 2, 3, 4, 5



STACK



PUSH \Rightarrow Insertion or Addition of element in stack

POP \Rightarrow Deletion or removal of element from stack

PEEK \Rightarrow ACCESS the Element





STACK



Q) Consider an empty stack S, with below operations performed in the same sequence

Push(x, S) : Push element 'x' into stack S

POP(S) : POP Top element from S and return $a = \text{POP}(S)$

PUSH(5, S)

PUSH(7, S)

PUSH(9, S)

$a = \text{POP}(S)$

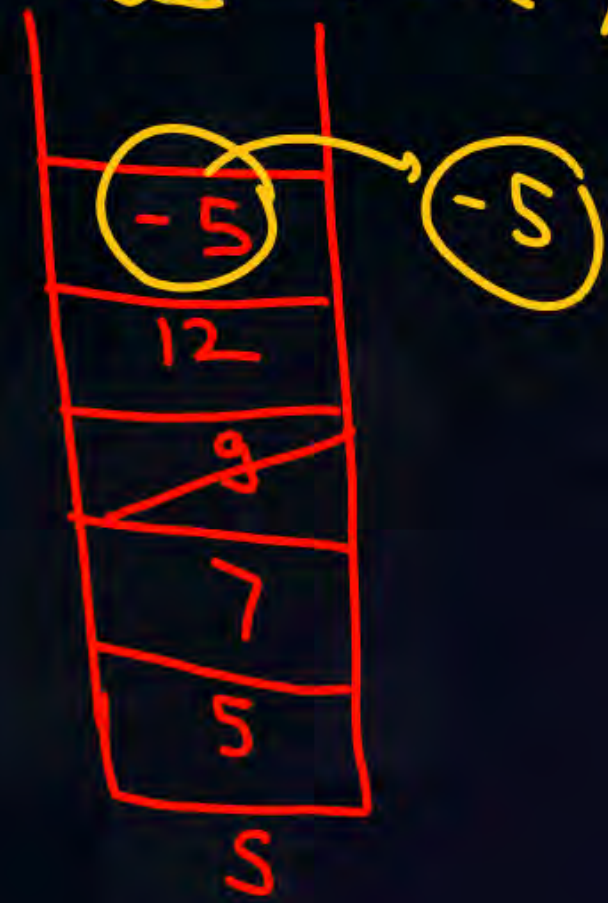
PUSH(12, S)

PUSH(-5, S)

$b = \text{POP}(S)$

$$a - b = 9 - (-5) = 14$$

$$a = 9$$
$$b = -5$$





STACK



Q) Consider 2 stacks S_1 and S_2 with elements $\{1, -3, 5\}$, $\{2, 4, 6\}$ respectively from bottom to top sequence. Now consider below operations.

Let, $\text{Top}(S_1) = a$ / $\text{Top}(S_2) = b$

$$i + j + a + b$$

$$a = 4$$

$$b = 4$$

$$11 + 9 + 4 + 4$$

$$= \boxed{28}$$

$$i = \text{peek}(S_1) + \text{pop}(S_2) = 11$$

$$\text{PUSH}(\text{pop}(S_2), S_1)$$

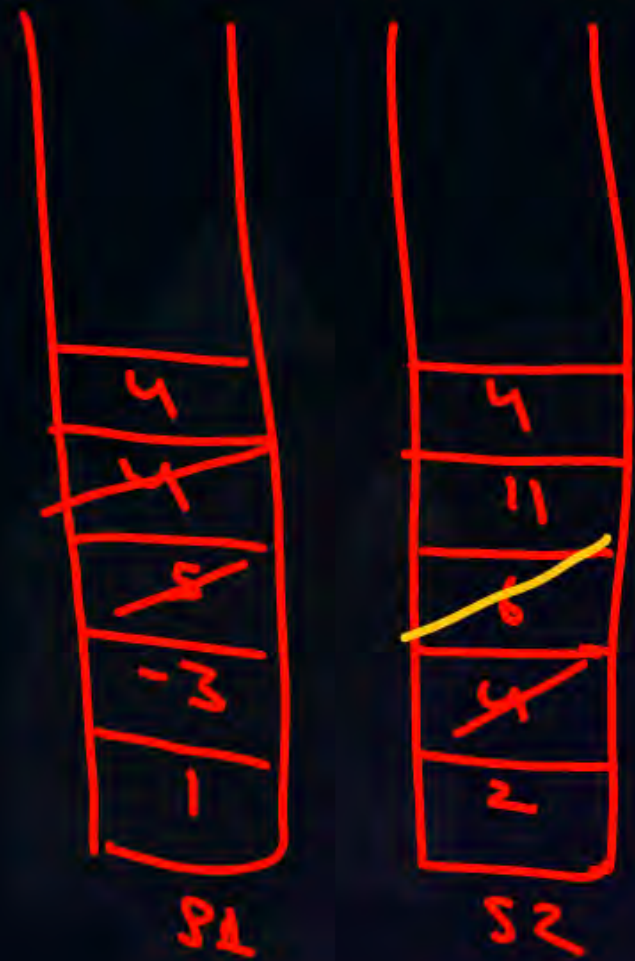
$$\text{PUSH}(i, S_2)$$

$$\text{PUSH}(\text{peek}(S_1), S_2)$$

$$\text{pop}(S_2)$$

$$j = \text{peek}(S_2) + \text{pop}(S_1) = 9$$

$$\text{PUSH}(\text{peek}(S_2), S_1)$$



2) which of the following sequences is a valid POP sequence for a stack that had elements pushed in the order: 1, 2, 3, 4, 5?

⇒ A) 4 5 3 2 1

✗ B) 4 3 5 1 2

✓ C) 5 4 3 2 1

✓ D) 3 4 2 1 5



4 5 3 2 1

4 3 5 2 1

5 4 3 2 1

3 4 2 1 5

✗ (5) 3 4 2 1



(A)



(B)



(C)



(D)

THANK - YOU