CS & IT ENGINEERING

Data Structures

Stacks and Quesues

DPP

Discussion Notes

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01 Question

02 Discussion

Q.1

Consider the following sequence of operations on an empty stack:

push (5); push (2); pop(); push(4); push(6); p=pop(); q=pop(); r=pop();

The value of p+q-r is- 5 .

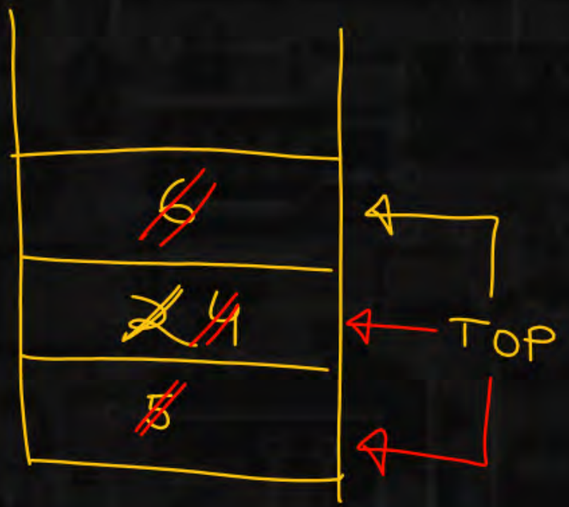
6+4-5 = 5

[NAT]

P = 6

q = 4

r = 5



Q.2

Which of the following includes the applications of stack?

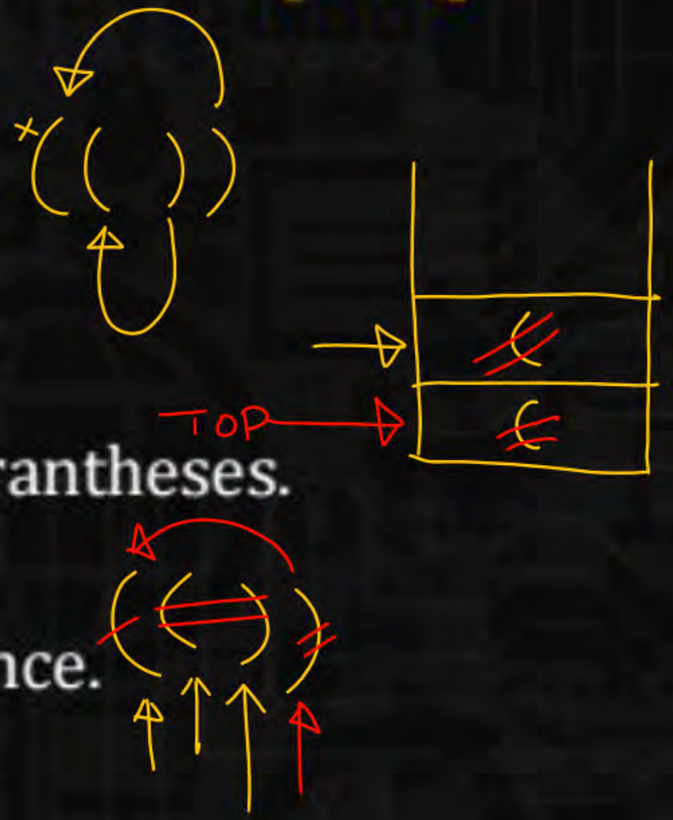
[MCQ]

A. Recursive function calls

B. HTML and XML Tag matching

C. Checking if an expression contains balanced parantheses.

D. Finding the maximum element in a given sequence.



Q.3

A stack is implemented using array. S represents the pointer to the top element in the stack. Initially the stack contains the elements: a(top), b. Assume Push(S, i) push an element i into the stack at index S. Whenever a Push operation will be performed, it will returns S++ after the push operation. Pop() pops the topmost element and returns the next top index. Top() is a function that returns the topmost element of the stack. Consider the following statements:

P: Top(Pop((Pop(Pop((Push(Push(S, c), d)))))))= a

Q: Pop(Pop(Pop(Pop(Push(Pop(Push(S, c)), d))))) = a

Which of the following statements is/are INVALID?

[MCQ]

B P only

A Q only

C Both P and Q

D Neither P nor Q

Push(2,c)

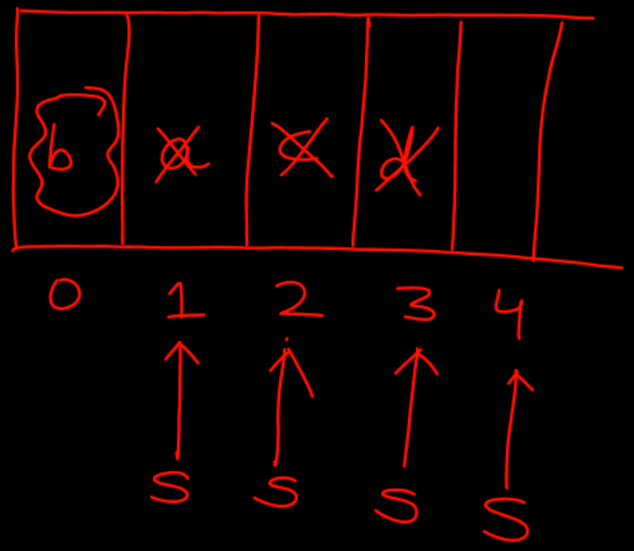
Push(3,d)

Pop()

Pop()

Pop()

b



Q.4

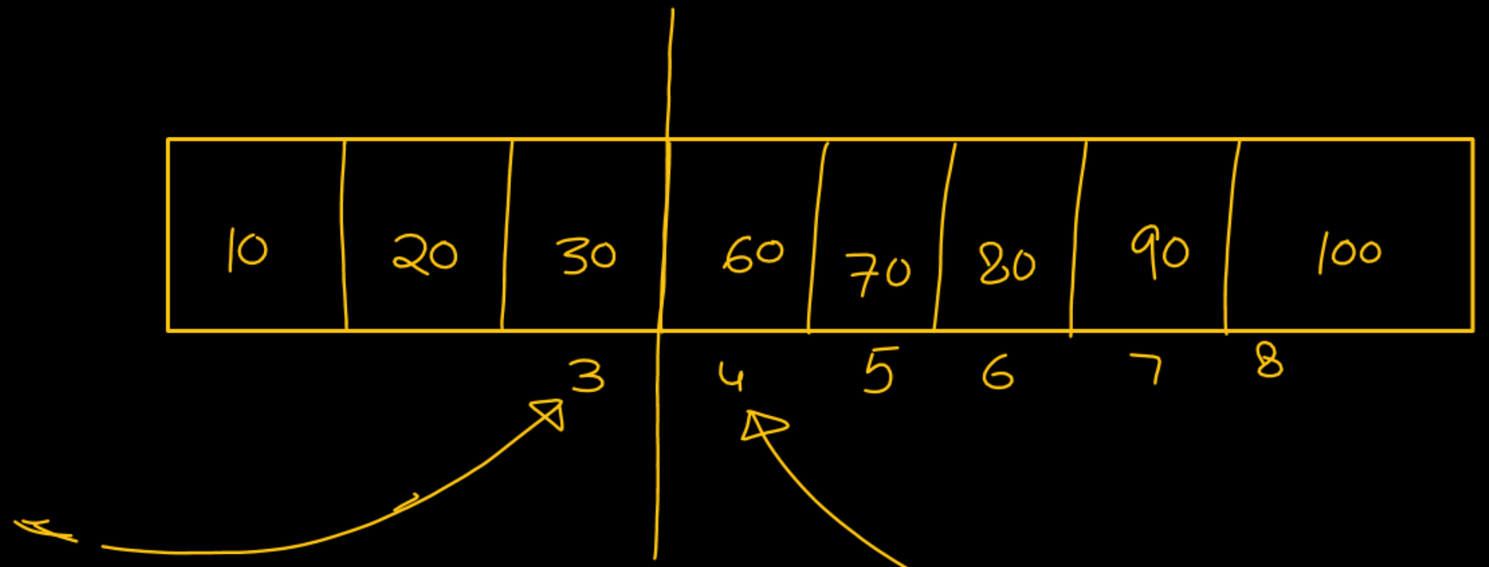
A single array A[1...MAXSIZE] is used to implement two stacks. The two stacks grow from opposite ends of the array. Variables top1 and top2 (topl< top 2) point to the location of the topmost element in each of the stacks. If the space is to be used efficiently, the condition for "stack full" is- [MCQ]

A (top1=MAXSIZE/2) and (top2=MAXSIZE/2+1)

B (top1=MAXSIZE/2) or (top2=MAXSIZE/2+1)

C top1 + top2 = MAXSIZE

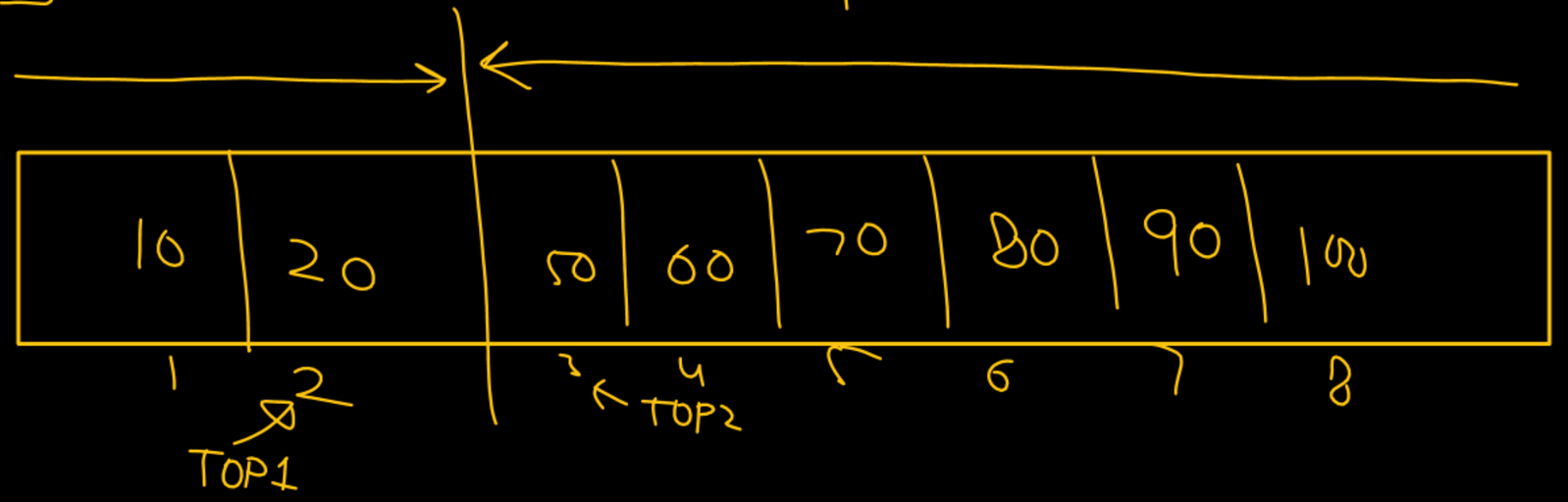
D top1=top2-1



1) 10
2) 20
3) 30

TOP1 = 3
TOP2 = 4

TOP2 = TOP1 + 1



Q.5

[MCQ]

A stack is implemented using a singly linked list that uses node structure-

```
struct node{
 int data;
struct node *next;
}node;
```

Let head denote the address of the start node respectively. Assume, the stack is not empty. Consider the following function that intends to delete the topmost element of the stack:

```
node * f(node *head){
node *p=head; _____;
free(p);
p=NULL;
}
```

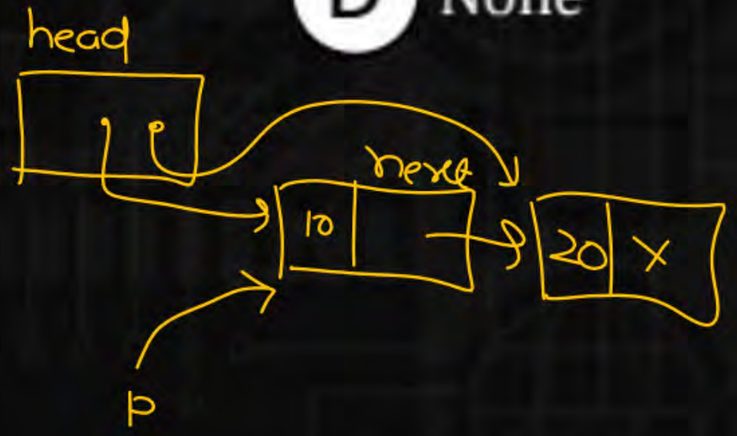
The missing blank is-

(A) while(p → next!=NULL)
p=p→next;

(B) p=p → next;

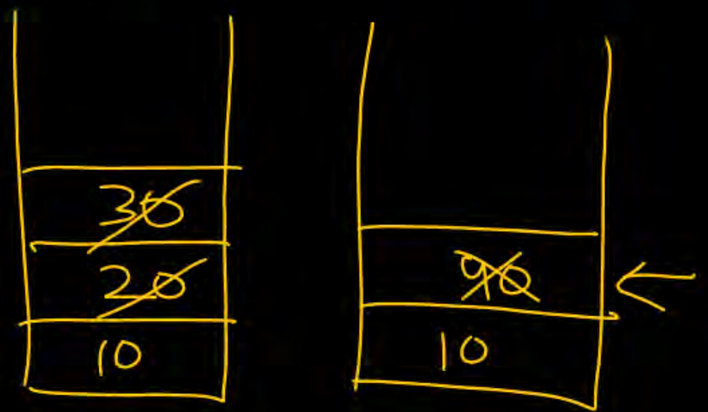
(C) head=head → next;

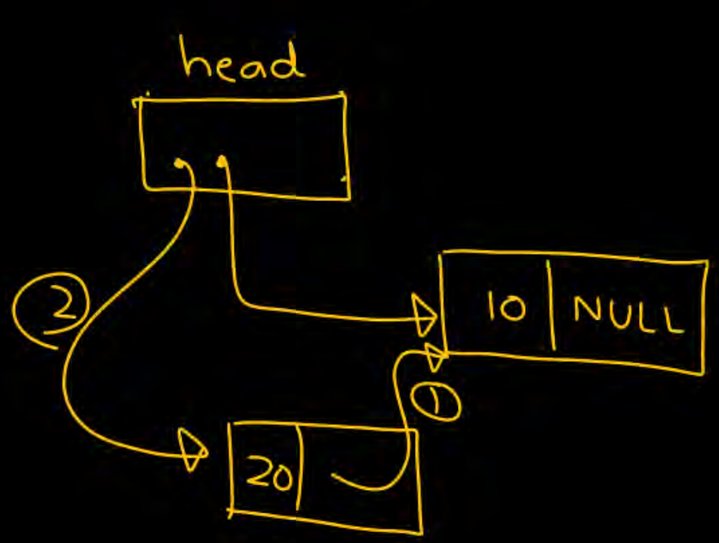
(D) None

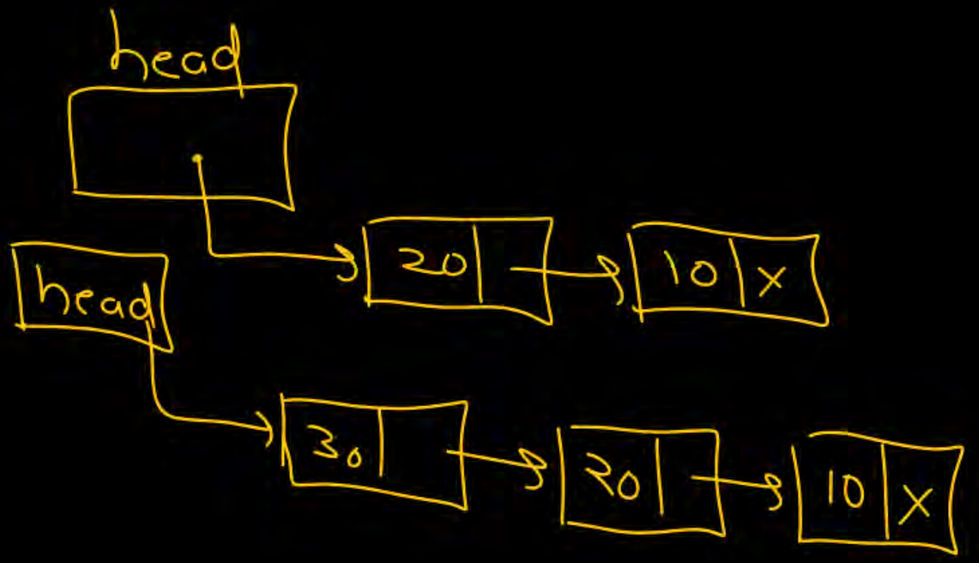


Push

10, 20, 30, Pop, pop, push(40), top







Q.6

Which one of the following permutations cannot be obtained in the output string using a stack and assuming that the input sequence is a, b, c, d, e in the same order?

[MSQ]

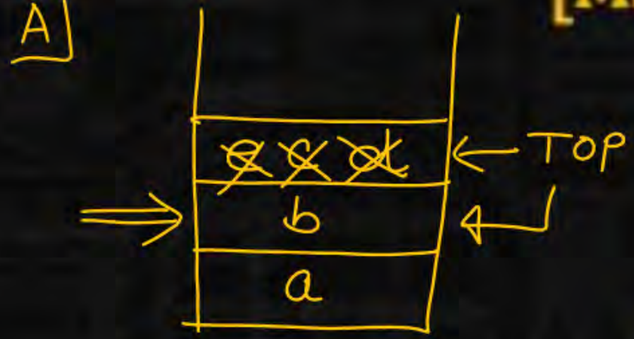
A) c d e a b

B) a e b c d

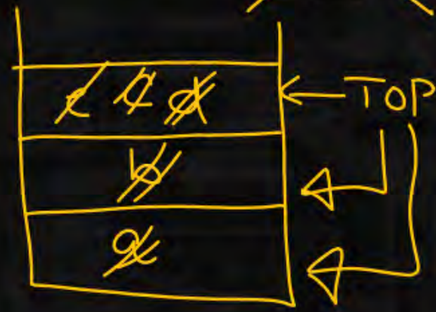
C) c d e b a

D) e d c b a

A,B

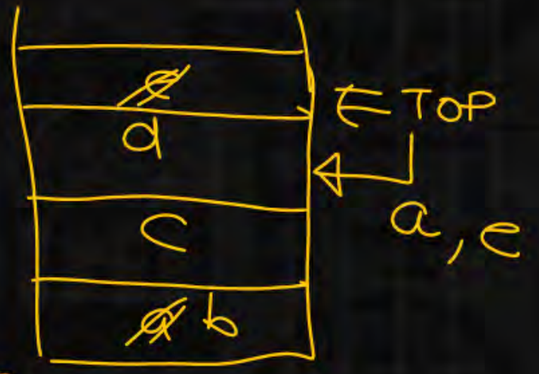


Pop()
Push(a)
Pop()
Push(c)
Pop()



Pop()
Push(d)
Pop()
Push(e) Pop()
Pop() Pop()

Push(a)
Pop()
Pop()
Push a,b,c,d,e



Q.7

A stack is implemented using array of size 4. S represents the pointer to the top element in the stack. Initially the stack contains the elements- a(top), b. Assume Push(S, i) push an element i into the stack at index S. Whenever a Push operation will be performed, it will returns S++ after the push operation. Pop() pops the topmost element and returns the next top index. isEmpty() returns TRUE if the stack is empty. isFull() returns TRUE if the stack is full. Consider the following statements:

P: isFull(Push(Pop(Push(Push(S, c), d))), e))= TRUE

Q: isEmpty(Push(Pop(Pop(Push(Pop(Push(S, c)), d))))), e) = FALSE

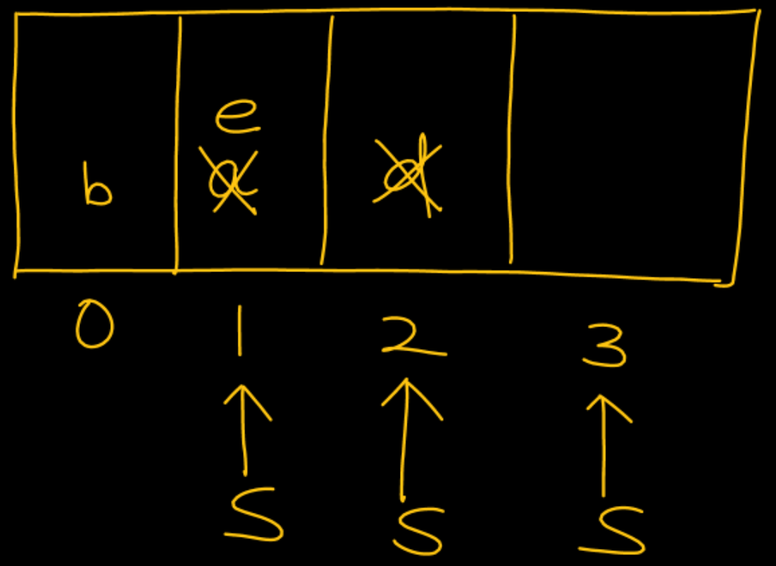
Which of the following statements is/are VALID? [MCQ]

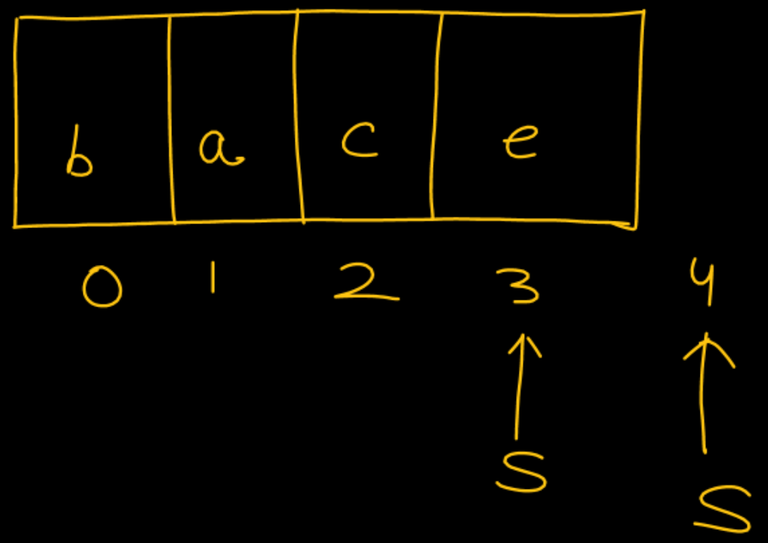
(A) P only

(B) Q only

(C) Both P and Q

(D) Neither P nor Q

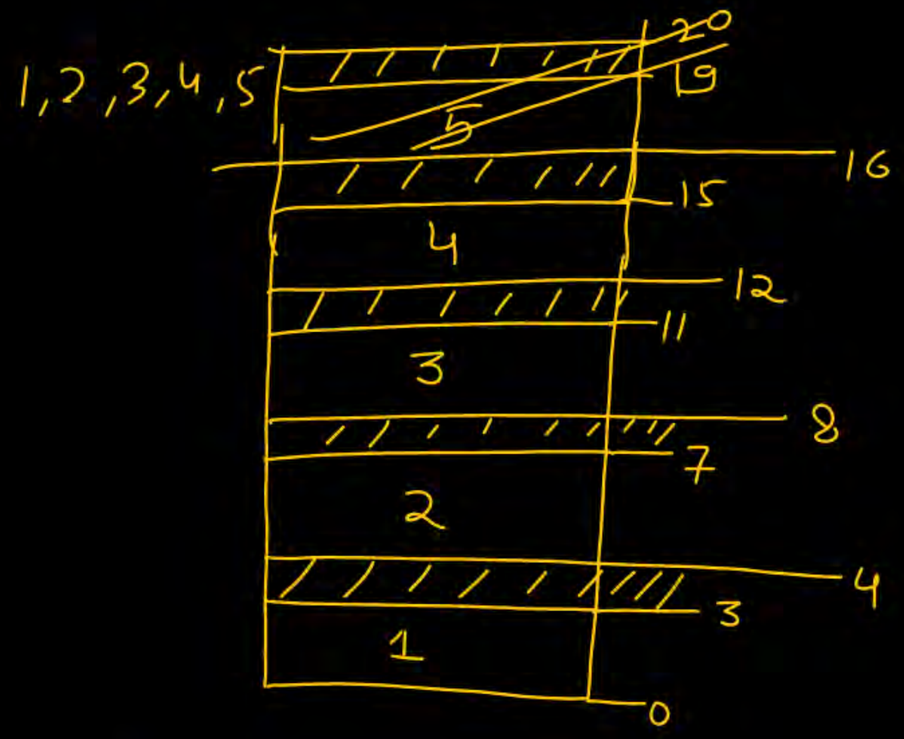

b
e
0
1
2
3
s
s
s


b
a
c
e
0
1
2
3
4
s
s

Q.8

Let S be a stack of size $n \geq 1$. Starting with the empty stack, suppose we push the first 5 natural numbers in sequence, and then perform 5 pop operations. Assume that Push and Pop operations take 3 seconds each, and 1 seconds elapse between the end of one such stack operation and the start of the next operation. The average stack-life of an element of this stack is _____.

[NAT]



	Push ends	Pop start	Pop end
1	3	36	39
2	7	32	35
3	11	28	31
4	15	24	27
5	19	20	23

1] Push(1)

2] Push(2)

3] Push(3)

4] Push(4)

5] Push(5)

Avg life :- $\Big((20-19)+(24-15)+(28-11)+(32-7)+(36-3)\Big)/5$

$= (1+9+17+25+33)/5$

$= 17$

Q.1 Consider the following infix expression:
P-Q/(R*S)+T*U
The prefix notation of the given expression is-

[MCQ]

(A) -+P/Q*RS*TU

(B) +-P/Q*RS*TU

(C) +-/PQ*RS*TU

(D) None of the above.

P-Q/(RXS)+TXU

P-Q/[XRS]+TXU

+-P/Q*RS*TU

P-[/QXRS]+TXU

P-[/QXRS]+[XTU]

[-P/QXRS]+[XTU]

(B)

Q.2

Consider the following expression:
P+Q/R-S*T^U/V-W

PQR/+STU^*V/-W-

The post fix notation of the given expression is-

[MCQ]

A PQR/+STU^*V/-W-

B PQ+RS-TU^*V/-W-

C PQR/-STU^*V/W+-

D None of the above

P+Q/R-S*T^U/V-W

P+Q/R-S*[TU^]/V-W

P+[QR/]-S*[TU^]/V-W

P+[QR/]-[STU^*]/V-W

P+[QR/]-[STU^*V/]-W

[PQR/+]-[STU^*V/]-W

[PQR/+STU^*V/-]-W

Q.3 Consider the following prefix notation: /^*+abc/de^gh

The postfix notation of the given expression is-

[MCQ]

$((a+b)*c)^{(d/e)} / (g^h)$

(B) ab+c*de/^gh^/

(A) abc+*de/^gh^/

(C) abc+de/*^gh^/

(D) None of the above

/ ^ * + a b c / d e ^ g h

/ ^ * + a b c (/ d e) g ^ h

/ ^ * (+ a b) c (d/e), (g^h)

/ ^ * (a+b), c, d/e, g^h

/ , ^ , (a+b)*c , d/e , g^h

/ , [(a+b)*c]^(d/e) , g^h

Q.3

Consider the following prefix notation:
/^*+abc/de^gh
The postfix notation of the given expression is-

[MCQ]

(B) ab+c*de/^gh^/

(A) abc+*de/^gh^/

(C) abc+de/*^gh^/

(D) None of the above

Q.4

Consider the following infix expression:

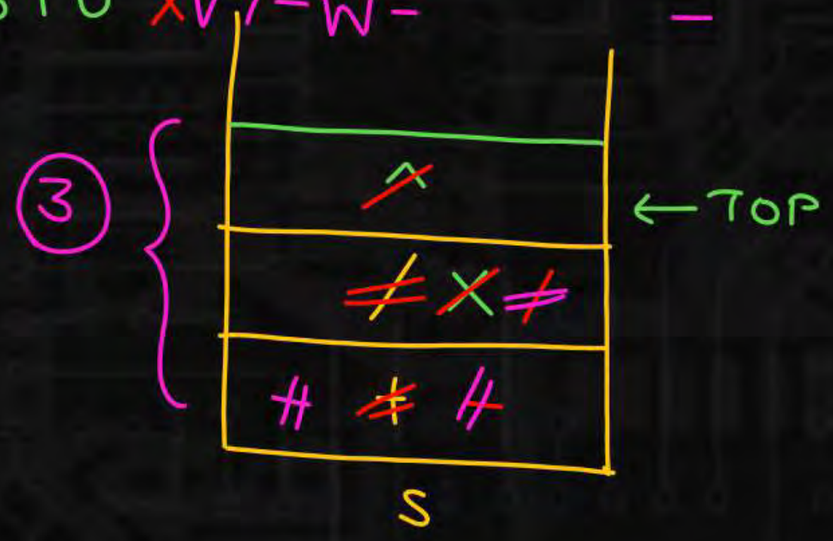
P+Q/R-S*T^U/V-W

The maximum size of the operator stack required to convert the given infix to postfix notation is 3.

[NAT]

infix: P+Q/R-S*T^U/V-W Eos

o/p: PQR/+STU^*V/-W-



Q.5

[MCQ]

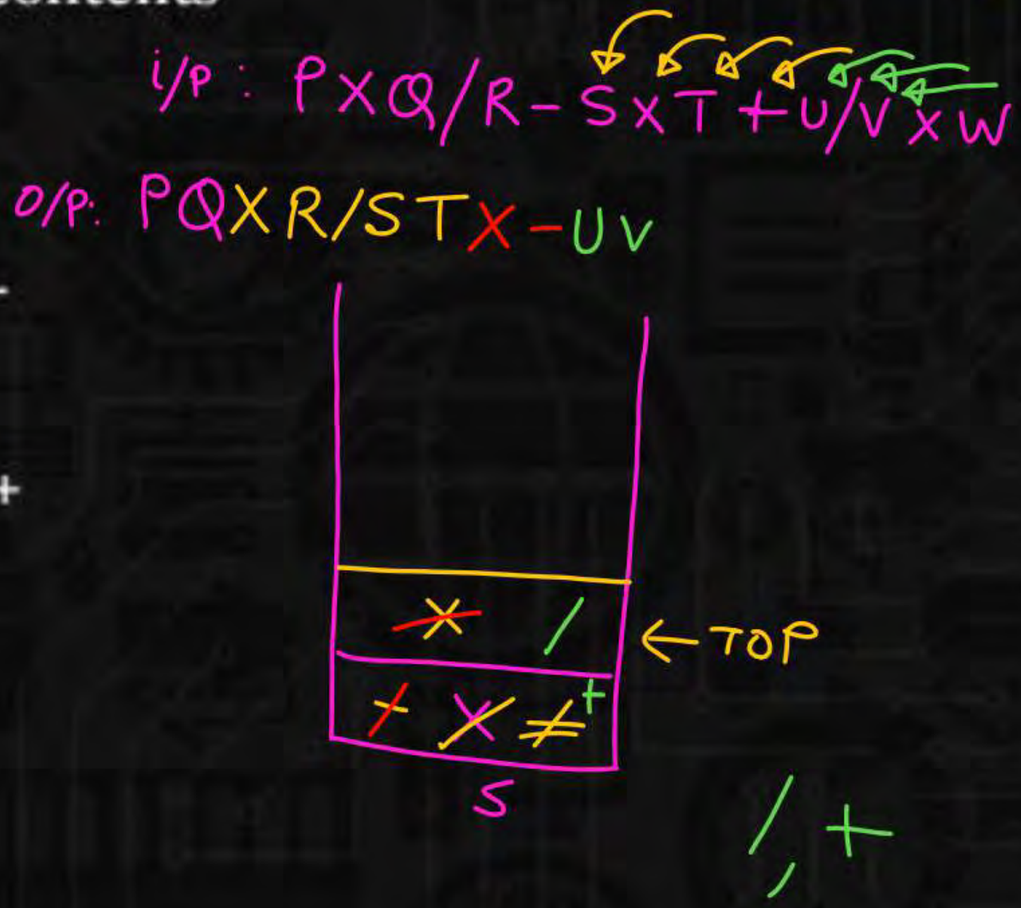
Consider the following infix expression:
P*Q/R-S*T+U/V*W
On reaching the symbol V, the top two contents of the
operator stack are:

A) /, *

B) /, -

C) *, +

D) /, +



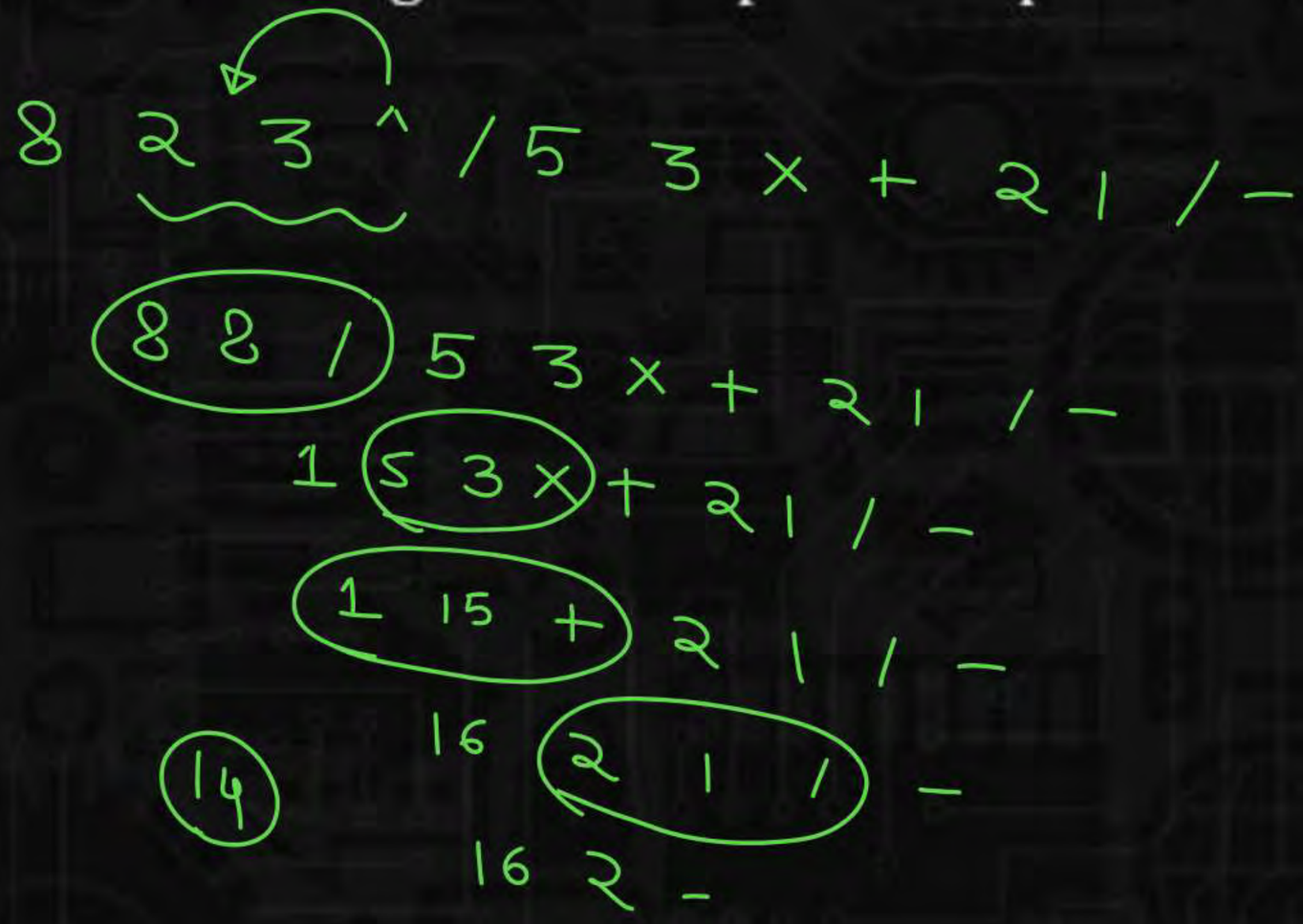
Q.6

Consider the following postfix expression:

8 2 3 ^ / 5 3 * + 2 1 / -

The result of evaluating the above postfix expression is 14.

[NAT]



Q.7

Let X be the result when the below postfix expression is evaluated:

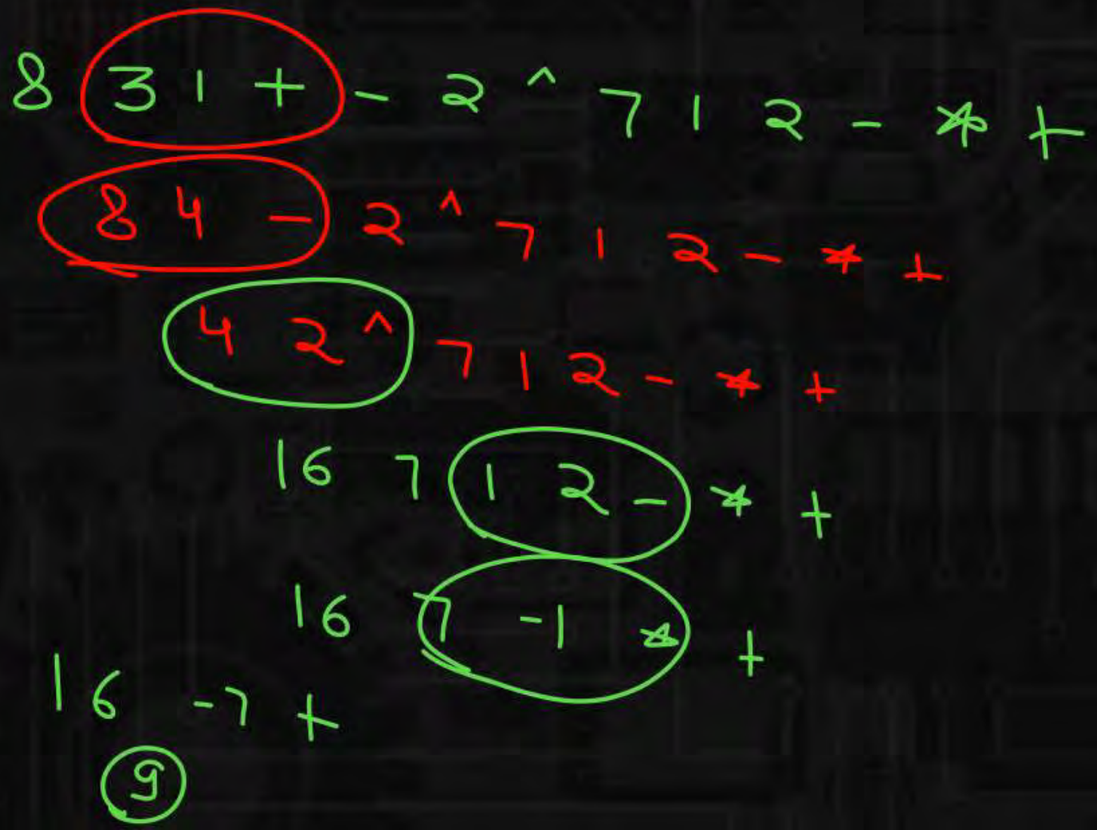
X = 8 3 1 + - 2 ^ 7 1 2 - * +

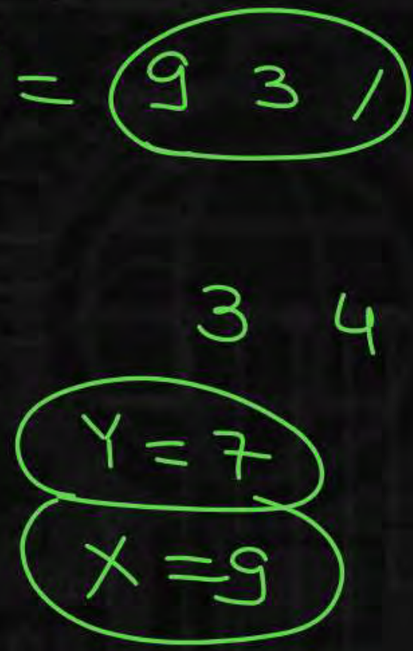
And Y be the result of the following postfix expression:

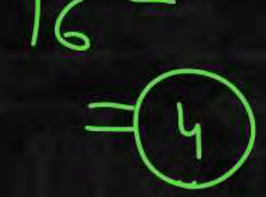
Y= X 3 / 4 +

The value of (X+Y)0.5 is ____4____

[NAT]







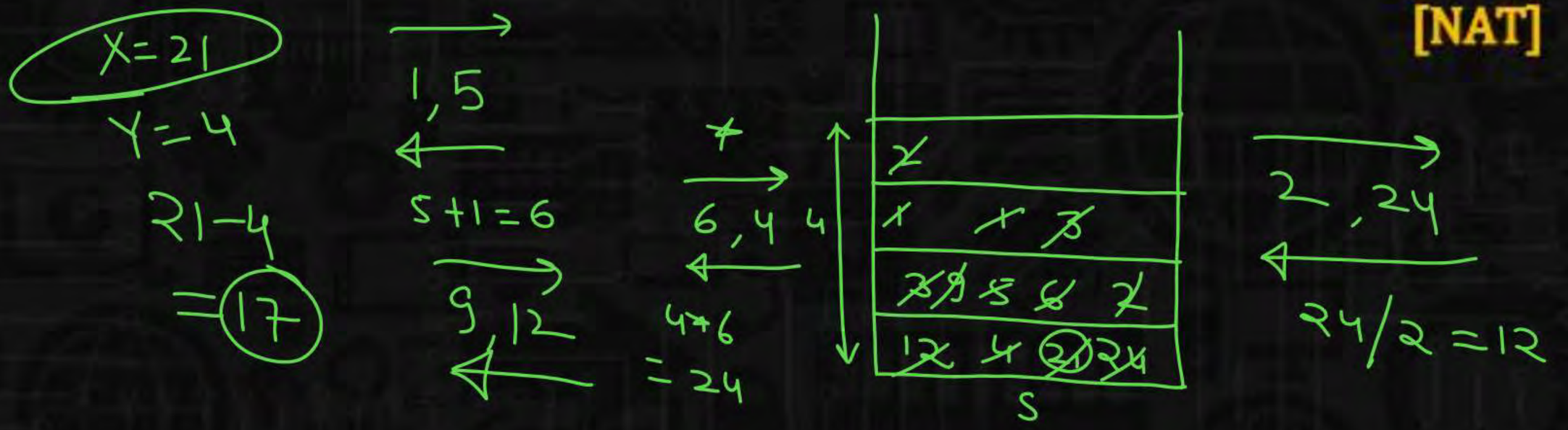
Q.8

Let X be the result when the below postfix expression is evaluated:

X = 4 5 1 + * 2 / 3 1 2 + * + End

Let Y be the maximum size of the operand stack, the value of X-Y is _____

[NAT]




THANK YOU GW
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