

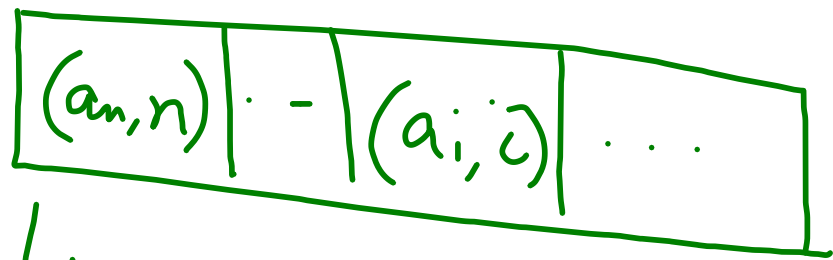
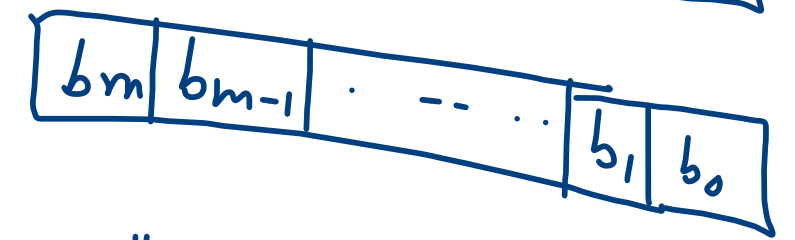
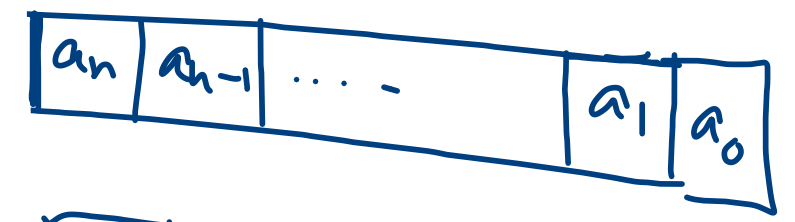
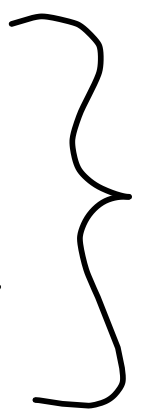
ADT

$$p_1(x) = (x^{1024} + 3x^2 + 4)$$
$$p_2(x) = (x^{864} + 2x^{32} + x^3 + x + 1)$$

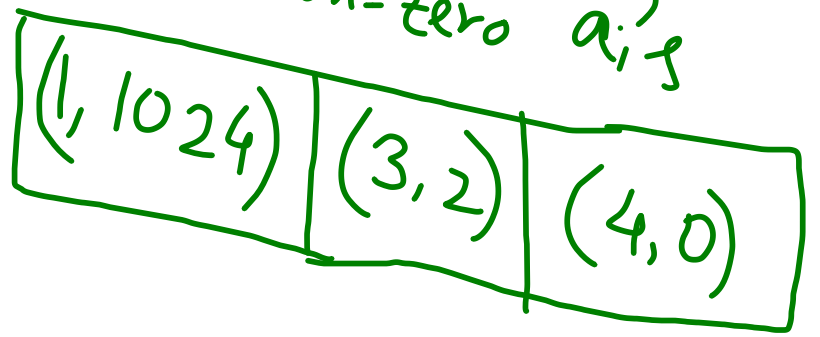
- Polynomial

$$p(x) = (a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0)$$

- Polynomial addition
- Polynomial multiplication



↳ non-zero a_i 's



(Structure)

- NOT "SPACE Efficient"
when most of the
co-eff $\rightarrow 0$

```
struct poly {
```

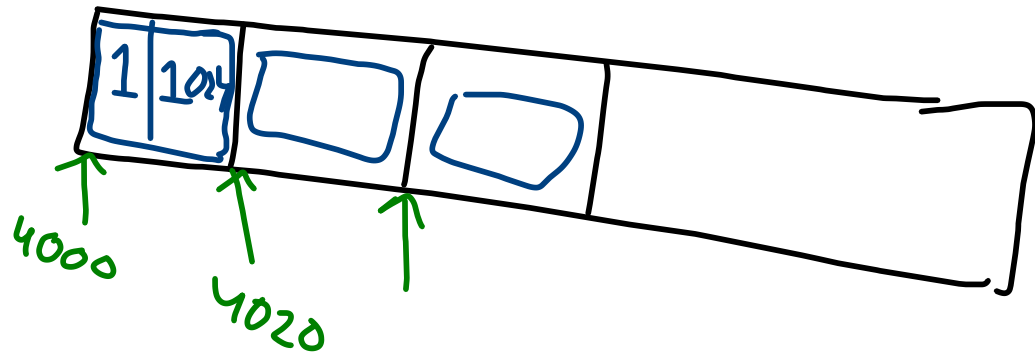
```
    float co-ef;  
    int exponent;
```

```
};
```

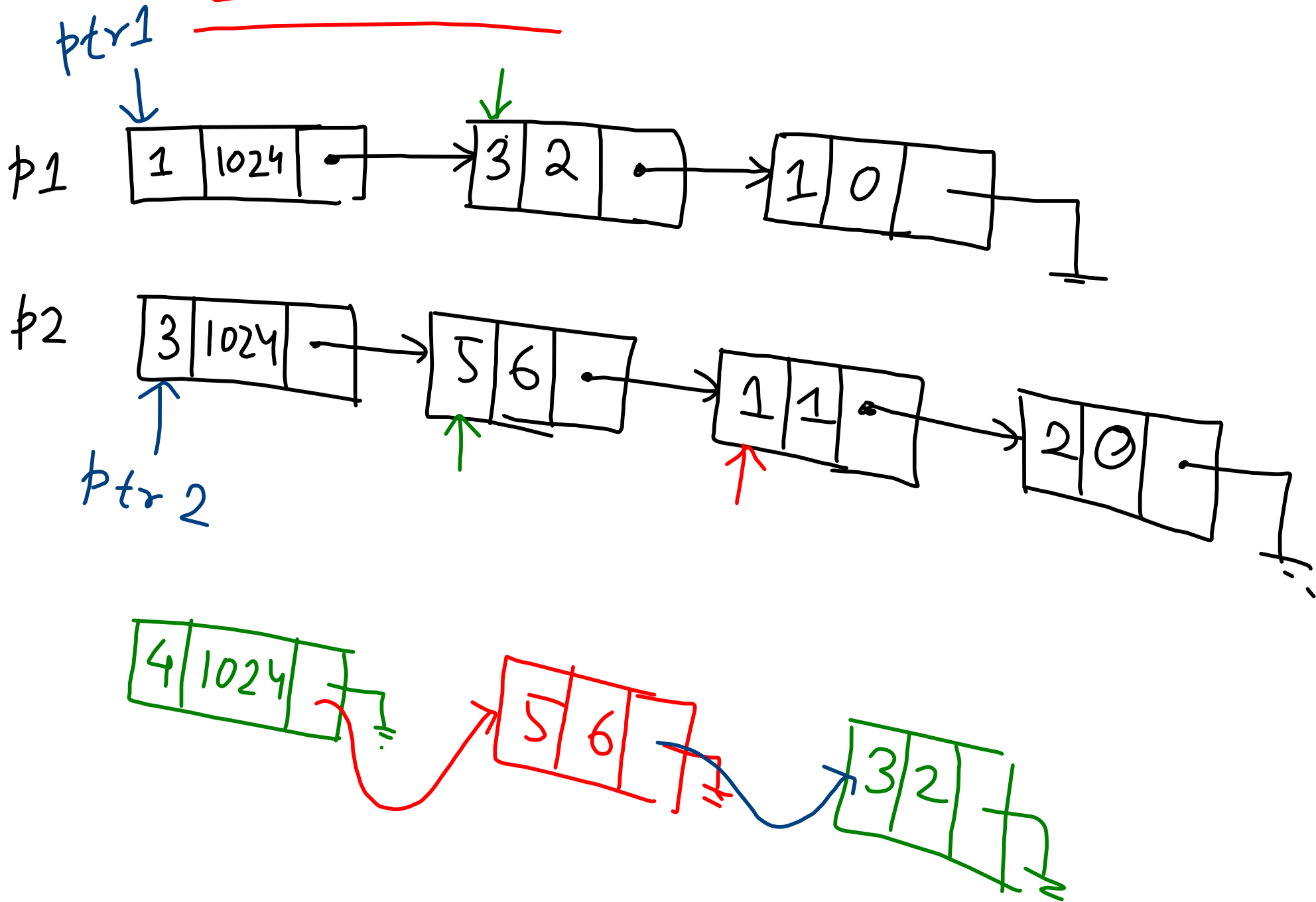
Array of Structures

```
poly p1[20], p2[30];
```

malloc
(dynamic
memory
allocation)



Linked List



Queue & Stack

Two data-structures where deletion is pre-specified.

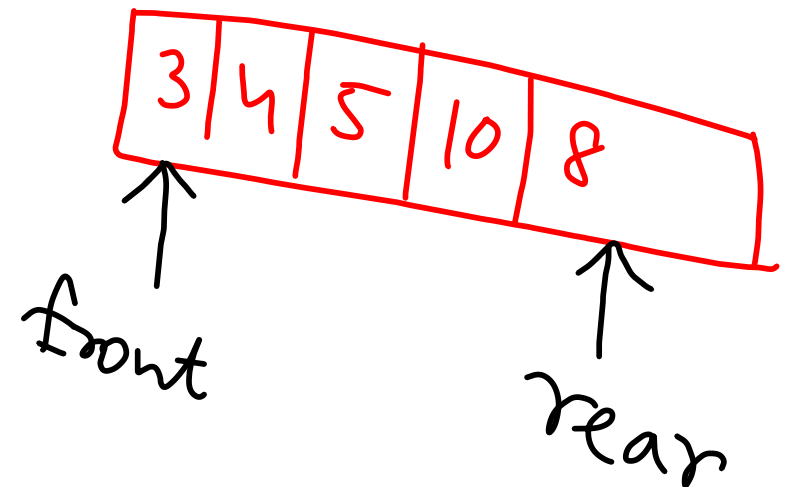
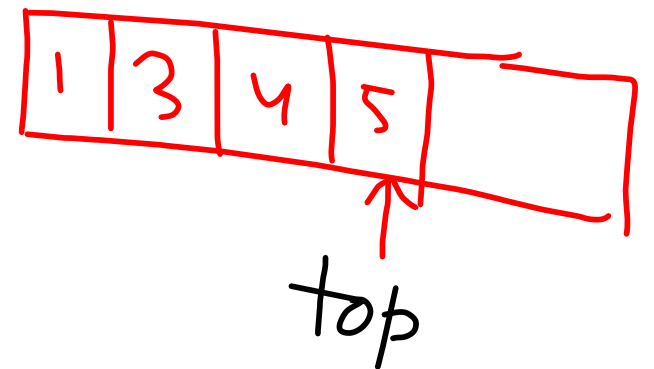
Stack: LIFO

(Last In First Out)

Queue:

FIFO

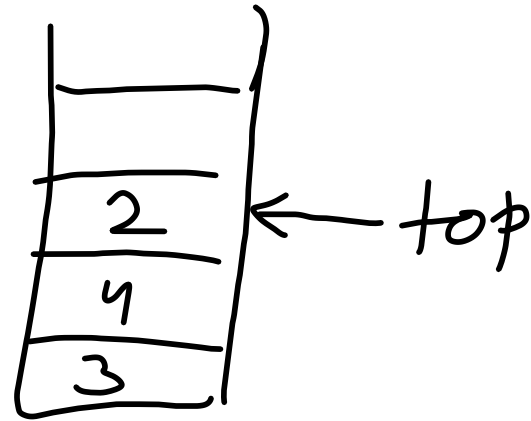
(First In First Out)



Stack

```
struct stack{  
    int element;  
};  
Stack s1 [MAX_SIZE]; int top = -1;
```

```
void push(int item)  
{  
    if (top == MAX_SIZE - 1)  
        Overflow  
    s1[++top] = item;  
}
```



Push, Pop

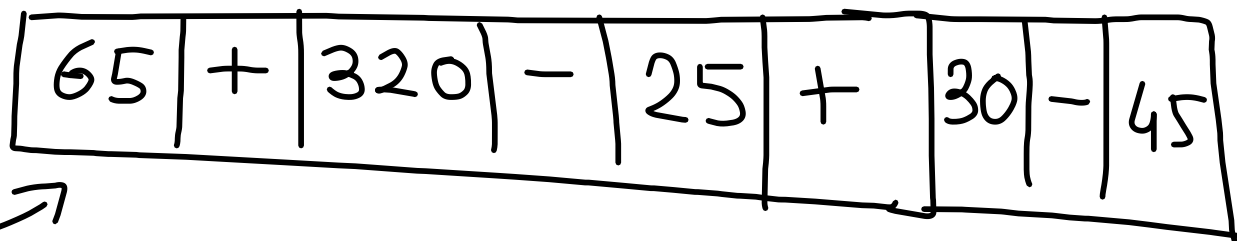
O(1)

```
int pop()  
{  
    if (top == -1)
```

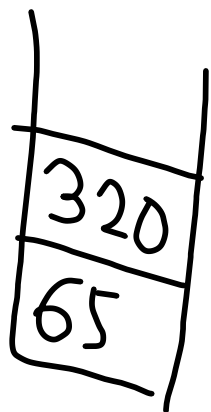
```
        UNDERFLOW  
        top = top - 1;  
        return s1[top];  
    }  
    return s1[top--];
```

Compute the Expression:

$$65 + 320 - 25 + 30 - 45$$

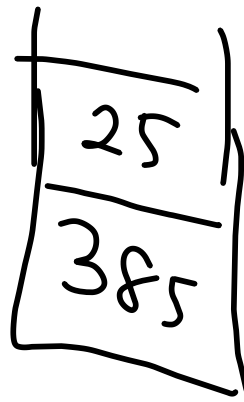


Character
array



+

$a_1 = \text{pop}()$
 $a_2 = \text{pop}()$
 $\text{push}(a_1 + a_2)$



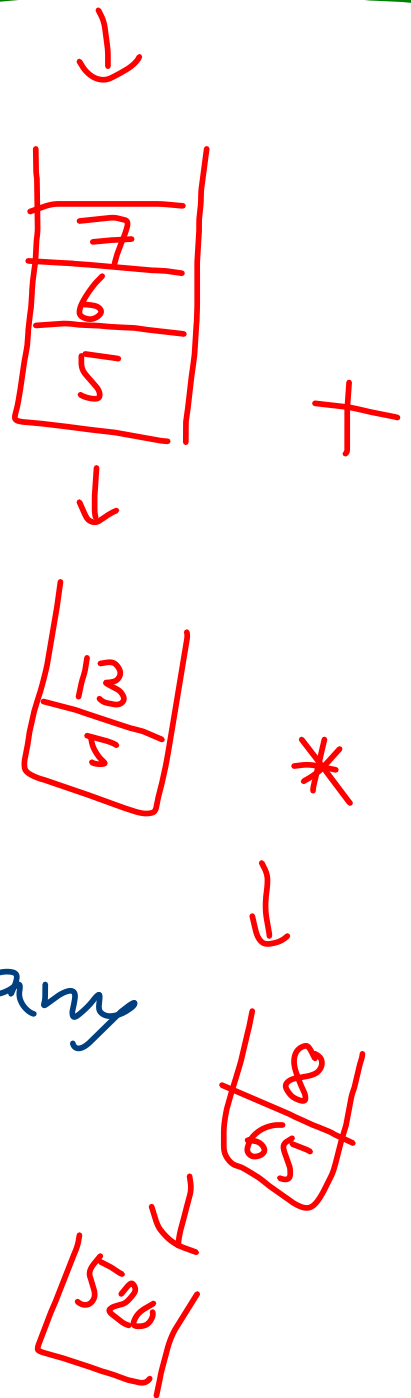
-

Evaluate

$5 * (6 + 7) * 8$

Postfix
 $5 6 7 + * 8 *$

Priority →
'(' : 3
'*' : 2
'+' : 1



Infix Notation:

$a \text{ op } b$

Postfix:

$a \ b \ \text{op}$

Prefix:

$\text{op } \ a \ b$

without any priority

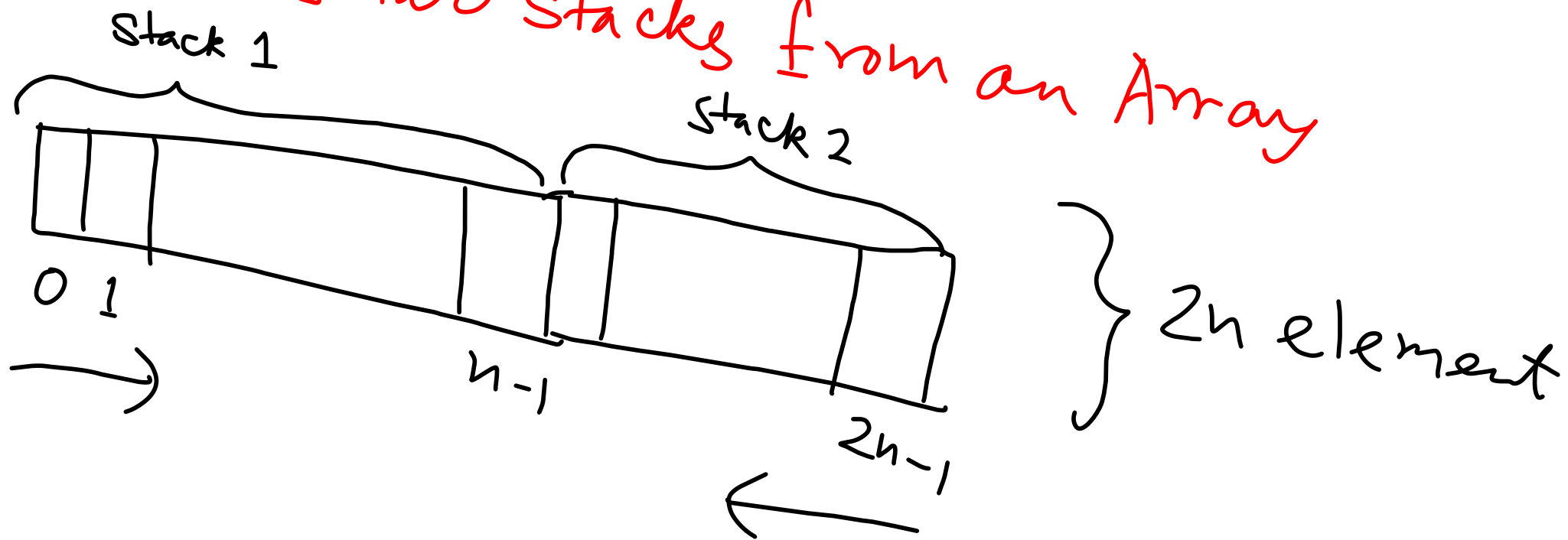
$$\underline{5 * (6 + 7) * 8}$$

<u>Current Token</u>	<u>Stack</u>	<u>output</u>
5	\emptyset	5
*	$\boxed{*}$	5
($\begin{array}{ c } \hline (\\ \hline * \\ \hline \end{array}$	5
6	$\begin{array}{ c } \hline (\\ \hline * \\ \hline \end{array}$	56
+	$\begin{array}{ c } \hline (\\ \hline + \\ \hline * \\ \hline \end{array}$	567
)	$\begin{array}{ c } \hline (\\ \hline * \\ \hline \end{array}$	567 +
*	$\boxed{*}$	567 + * 8
\emptyset	$\boxed{*}$	

When token is an operation

- Pop the stack until you find a symbol of lower priority than current.
- if '(' do not remove until ')'
- popped stack elements written to o/p.
- Stack current symbol
- If ')' \Rightarrow pop the stack down - first '('

- Report Min element in $O(1)$ time?
 - Report Min element in $O(1)$ time, $O(1)$ space. [You don't need to store the exact elements]
 - Builds two stacks from an Array
- Stack



push(20)

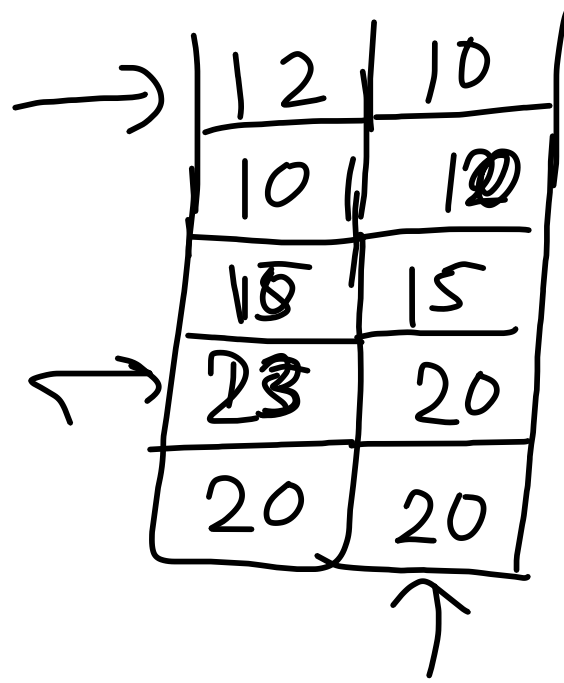
push(23)

push(15)

push(10)

push(12)

pop()



$O(n)$ space