

## Assignment#1 - Check Validity of an Arithmetic Expression using Stack Data Structure in any of your preferred Programming Language (C/C++/Java)

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**Code:**

```
#include <bits/stdc++.h>
```

```
#include <iostream>
```

```
using namespace std;
```

```
#define size 50
```

```
char stacks[size];
```

```
int top = -1;
```

```
bool isempty()
```

```
{
```

```
    if(top== -1)
```

```
        return true;
```

```
    else
```

```
        return false;
```

```
}
```

```
void push(char arr[],int j)
```

```
{  
    if (top==size-1)  
    {  
        cout<<"stack is full\n";  
    }  
    else  
    {  
        top++;  
        stacks[top]= arr[j];  
    }  
}
```

```
void pop()  
{  
    if(isempty())  
    {  
        cout<<"stack is empty\n";  
    }  
    else  
    {  
        top--;  
    }  
}
```

```
void showtop()  
{
```

```
if (isempty())
{
    cout<<"array is empty and top = "<<top;
}
else
{
    cout<<"\ntop position is = "<<top<<"\nelement in top is = "<<stacks[top];
    cout<<endl;
}
}
```

```
void showstack()
{
    if(isempty())
    {
        cout<<endl<<"stack is empty because in first we find a closing bracket";
    }
    else
    {
        cout<<"stack is = ";
        for(int i=0;i<=top;i++)
        {
            cout<<stacks[i];
        }
    }
    cout<<endl;
```

```
}
```

```
void check(char arr[], int n)
```

```
{
```

```
    for(int j=0;j<n;j++)
```

```
    {
```

```
        if(arr[j]=='(' || arr[j]=='{' || arr[j]=='[')
```

```
        {
```

```
            push(arr, j);
```

```
            showtop();
```

```
            showstack();
```

```
        }
```

```
        else if(arr[j]==')' || arr[j]=='}' || arr[j]==']')
```

```
        {
```

```
            if (isempty())
```

```
            {
```

```
                goto L;
```

```
            }
```

```
        else
```

```
        {
```

```
            if(stacks[top]=='('&&arr[j]==')')
```

```
            {
```

```
                pop();
```

```
            }
```

```
            else if(stacks[top]=='{'&&arr[j]=='}')
```

```
            {
```

```
                pop();
```

```

    }

    else if(stacks[top]=='{'&&arr[j]=='})')

    {

        pop();

    }

    else

    {

        cout<<"\nopening parenthesis is missing! for = "<<arr[j]<<endl;

        showtop();

        showstack();

        goto L;

    }

}

}

}

L: if (top== -1)

{

    cout<<endl<<"Arithmetic Expression is valid"<<endl;

}

else

{

    cout<<endl<<"Arithmetic Expression is not valid"<<endl;

    showstack();

}

}

int main()

```

```

{

    int n;

    cout << "size of your array is = ";

    cin >> n;

    cout << endl;

    char arr[n];

    cout << "input your Arithmetic Expression = ";

    for (int i=0; i<n; i++)

    {

        cin >> arr[i];

    }

    check(arr, n);

    return 0;

}

```

Output :

The screenshot shows a C++ IDE with the following code in `Arithmetic.cpp`:

```

10 bool isempty()
11 {
12     if(top== -1)
13         return true;
14     else
15         return false;
16 }
17 void push(char arr[], int j)
18 {
19     if (top==size-1)
20     {
21         cout<<"stack is full\n";
22     }
23     else
24     {
25         top++;
26         stacks[top]= arr[j];
27     }
28 }
29 void pop()
30 {
31     if(isempty())
32     {
33         cout<<"stack is empty\n";
34     }
35     else
36     {
37         top--;
38     }
39 }
40
41

```

The output window shows the following text:

```

Select "H:\Southeast University\Adv Algo (MSRS) 2021\Lab\Lab 1\Arithmetic.exe"
size of your array is = 5
input your Arithmetic Expression = {2+3}
top position is = 0
element in top is = {
stack is = {
opening parenthesis is missing! for = }
top position is = 0
element in top is = {
stack is = {
Arithmetic Expression is not valid
stack is = {
Process returned 0 (0x0)   execution time : 36.688 s
Press any key to continue.

```