DATA STRUCTURE HOME TASK:

F24-0767

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Task A:

```cpp
#include <iostream>

using namespace std;


int main() {
    char exp[100];
    int stack[100], top = -1;


    cout << "Enter Postfix Expression: ";
    cin.getline(exp, 100);


    for (int i = 0; exp[i] != '\0'; i++) {
        char c = exp[i];


        if (c == ' ') {
            continue; // skip spaces
        }



        if (c >= '0' && c <= '9') {
            stack[++top] = c - '0'; // push digit
        }
```
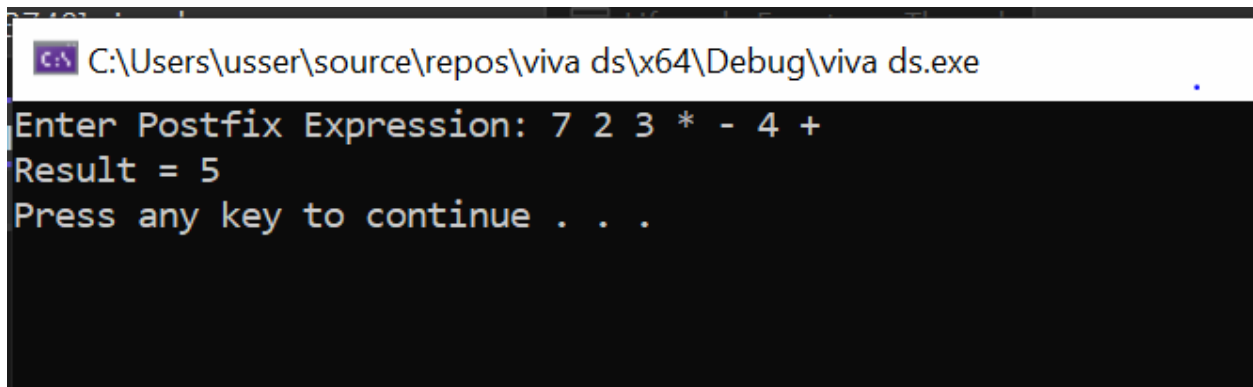
```cpp
    else {

        int val2 = stack[top--];

        int val1 = stack[top--];


        if (c == '+') stack[++top] = val1 + val2;

        else if (c == '-') stack[++top] = val1 - val2;

        else if (c == '*') stack[++top] = val1 * val2;

        else if (c == '/') stack[++top] = val1 / val2;

    }

}


cout << "Result = " << stack[top] << endl;

system("pause");

return 0;

}
```

```
 C:\Users\usser\source\repos\viva ds\x64\Debug\viva ds.exe

Enter Postfix Expression: 7 2 3 * - 4 +
Result = 5
Press any key to continue . . .
```

```
Enter Postfix Expression: 2 3 1 * + 9 -
Result = -4
Press any key to continue . . .
```

Task B:

```cpp
#include <iostream>

using namespace std;


int main() {

    char exp[100];

    string stack[100];

    int top = -1;


    cout << "Enter Postfix Expression: ";

    cin.getline(exp, 100);


    for (int i = 0; exp[i] != '\0'; i++) {

        char c = exp[i];


        if (c == ' ') continue; // skip spaces


        if ((c >= '0' && c <= '9') || (c >= 'a' && c <= 'z') || (c >= 'A' && c <= 'Z')) {

            string s = "";
```

```cpp
                s += c;
                stack[++top] = s;
            }


            else {
                if (top < 1) {
                    cout << "Invalid Postfix Expression!";
                    return 0;
                }
                string val2 = stack[top--];
                string val1 = stack[top--];
                string result = "(" + val1 + c + val2 + ")";
                stack[++top] = result;
            }
        }


        if (top != 0) {
            cout << "Invalid Postfix Expression!";
        }
        else {
            cout << "Infix Expression = " << stack[top];
        }


        return 0;
    }
```
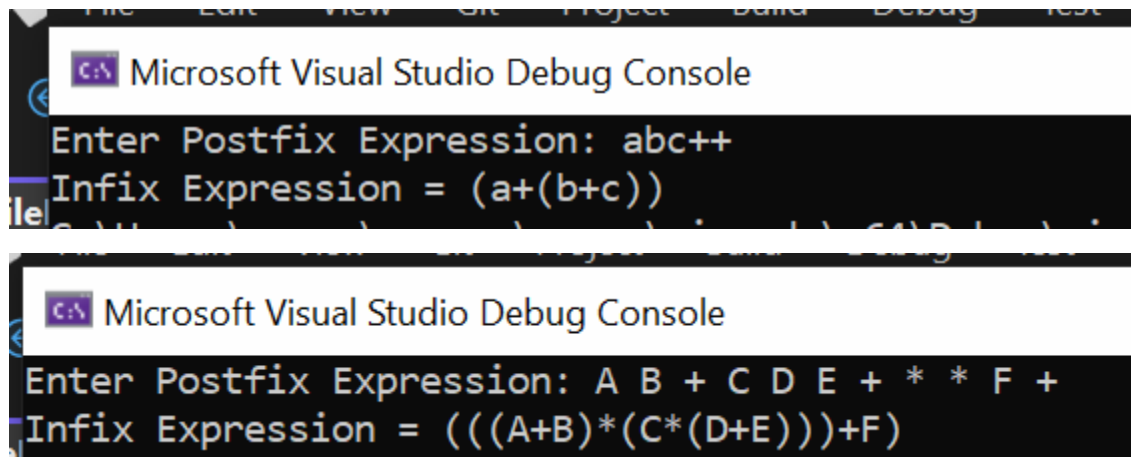
Enter Postfix Expression: abc++
Infix Expression = (a+(b+c))

Enter Postfix Expression: A B + C D E + * * F +
Infix Expression = (((A+B)*(C*(D+E)))+F)

Task C:

```cpp
#include <iostream>

using namespace std;


int main() {

    char exp[100];

    string stack[100];

    int top = -1;


    cout << "Enter Prefix Expression: ";

    cin.getline(exp, 100);



    int len = 0;

    while (exp[len] != '\0') len++;


    for (int i = len - 1; i >= 0; i--) {

        char c = exp[i];


        if (c == ' ') continue; // skip spaces
```
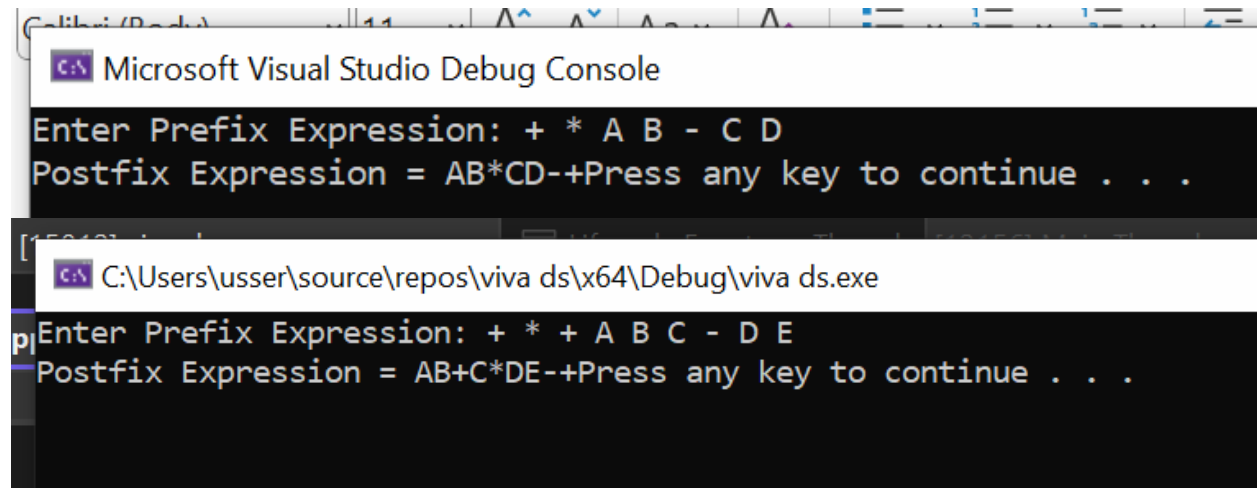
```cpp
        if ((c >= '0' && c <= '9') || (c >= 'a' && c <= 'z') || (c >= 'A' && c <= 'Z')) {

            string s = "";

            s += c;

            stack[++top] = s;

        }


        else {

            if (top < 1) {

                cout << "Invalid Prefix Expression!";

                return 0;

            }

            string val1 = stack[top--];

            string val2 = stack[top--];

            string result = val1 + val2 + c;

            stack[++top] = result;

        }

    }


    if (top != 0) {

        cout << "Invalid Prefix Expression!";

    }

    else {

        cout << "Postfix Expression = " << stack[top];

    }


    system("pause");

    return 0;
```

}

Microsoft Visual Studio Debug Console

```
Enter Prefix Expression: + * A B - C D
Postfix Expression = AB*CD-+Press any key to continue . . .
```

C:\Users\usser\source\repos\viva ds\x64\Debug\viva ds.exe

```
Enter Prefix Expression: + * + A B C - D E
Postfix Expression = AB+C*DE-+Press any key to continue . . .
```