

Assignment 1

4. Programming assignment

Write a program to read a postfix expression and display its numeric value.

All variables are single letter, MUST use stack.

Sample Input/Output

```

Enter the values of a, b, c and d: 5 7 2 4
Enter a postfix expression with $ at the end: ab+cd*-$
      Value = 4
CONTINUE(y/n)? y
Enter a postfix expression with $ at the end: abcd+++ $
      Value = 18
CONTINUE(y/n)? y
Enter a postfix expression with $ at the end: abcd*-*$
      Value = -5
CONTINUE(y/n)? n

```

Directions. Include the following information at the beginning of your program.

Please write the names in alphabetical order and last name followed by first name.

```

//-----
//      Group names: Brown, John and Smith, Anna
//      Assignment   : CPSC 323, No.1
//      Due date     : .....
// Purpose: this program reads an expression in postfix form, evaluates the expression
// and displays its value
//-----
Comment all functions and class members.

```

Assignment 2

Programming assignment

1. (17 points) Write a program to find the value of a postfix expression. Variables are one or more characters each. We might have some integer numbers as part of the expression. (Hint. Read each part of the expression as a token of type string, if the first character of the token is a letter that indicates the token is a variable name, push its value in stack. If the token is an integer number use the predefined function stoi (member of <string> library) to return its numeric value of the token.

Sample I/O:

<p>Enter a postfix expression with a \$ at the end: <u>20_jerry</u> 45 + tom - * \$ Enter the value of jerry: <u>10</u> Enter the value of tom: <u>5</u> Expression's value is <u>1000</u> CONTINUE(y/n)? y</p>	<p>Enter a postfix expression with a \$ at the end: <u>myscore_yourscore</u> 45 + 100 + * \$ Enter the value of <u>myscore</u>: <u>3</u> Enter the value of <u>yourscore</u>: <u>5</u> Expressions value is <u>450</u> CONTINUE(y/n)? n</p>
---	---

As input, please use the given expressions and the given values.

2. Given the language $L = a^*c^*b(a+c)^*$ with alphabet $= \{a, b, c\}$. (1) Construct an FA to accept L. (2) complete the FA (3) construct a transition table for the new FA. (4) Write a program to decide whether the following words are members of L or not
W1 = bac W2 = aa b a³ W3 = baaccb

Assignment 3

III FORM OF DNF

- $S \rightarrow [a] \{b\} d$
- $S \rightarrow \{a|b\} \{c\}$
- $S \rightarrow \{a\} \{b\} [c] \{d\}$

Programming (10 points each)

- Write a program to read one token at a time from the given text file and determine whether the token is
 - A number
 - An identifier (must start with underscore or a letter, followed by more letters, more digits, or more underscores)
 - A reserved word. List of reserved words: string reserved[5]={"while", "for", "switch", "do", "return"};

K-mart
23andMe
456
Tax 2018
While
switch
do_it
_Fall_20
_Jan 19

Sample output for #1

Token	number	identifier	reserved word
K-mart	no	no	no
23andMe	no	no	no
456	yes	no	no

.....

- Given CFG: $S \rightarrow aS \mid bB \mid cC$
 $B \rightarrow bB \mid aC \mid \lambda$
 $C \rightarrow aS \mid \lambda$
 Write a **program** to determine whether an input string is accepted or rejected by the grammar. Hint, first you have to complete the FA

Try input strings: w1=abbbcaaa\$, w2=ccccbbb\$, w3=aabbaac\$

Assignment 7

Programming part:

2. (25 points) Given the following CFG and the Predictive Parsing table. Write a program to determine which of the following are accepted/rejected by the given grammar (1) $(i+i)*i\$$, (2) $i*(i-i)\$$, (3) $i(i+i)\$$. Show the content of the stack after each match.

$E \rightarrow E+T$; $E \rightarrow E-T$; $E \rightarrow T$; $T \rightarrow T*F$; $T \rightarrow T/F$; $T \rightarrow F$; $F \rightarrow i$; $F \rightarrow (E)$

states	i	+	-	*	/	()	\$
E	TQ					TQ		
Q		+TQ	-TQ				λ	λ
T	FR					FR		
R		λ	λ	*FR	/FR		λ	λ
F	i					(E)		

3. (25 points) Same as problem no. 2, include the $S \rightarrow aW$, $W \rightarrow = E$ and $F \rightarrow a$ rules to the beginning of the grammar so that the grammar becomes this :

$S \rightarrow aW$ $W \rightarrow = E$
 $E \rightarrow E+T$ $E \rightarrow E-T$ $E \rightarrow T$
 $T \rightarrow T*F$ $T \rightarrow T/F$ $T \rightarrow F$
 $F \rightarrow a$ $F \rightarrow (E)$

NOTE: S is the starting state

Construct the parsing table (not exactly the same as above) and modify your program to trace input statements (i) $a=(a + a)*a\$$, (ii) $a=a*(a-a)\$$, (iii) $a=(a+a)a\$$

Assignment 8

Given the following CFG and the LR Parsing table. Write a program to trace the input strings

(1) $(i+i)*i\$$ (2) $(i*)\$$. To determine whether they satisfy the given CFG or not.

CFG	FIRST	FOLLOW
(1) $E \rightarrow E + T$	$FIRST(E) = \{ (i \}$	$FOLLOW(E) = \{ \$ + - \}$
(2) $E \rightarrow E - T$	$FIRST(T) = \{ (i \}$	$FOLLOW(T) = \{ \$ + - \} * / \}$
(3) $E \rightarrow T$	$FIRST(F) = \{ (i \}$	$FOLLOW(F) = \{ \$ + - \} * / \}$
(4) $T \rightarrow T * F$		
(5) $T \rightarrow T / F$		
(6) $T \rightarrow F$		
(7) $F \rightarrow (E)$		
(8) $F \rightarrow i$		

LR Parsing table for the above CFG

State	Terminals								Non-terminals		
	i	+	-	*	/	()	\$	E	T	F
0	S5					S4			1	2	3
1		S6	S7					ACC			
2		R3	R3	S8	S9		R3	R3			
3		R6	R6	R6	R6		R6	R6			
4	S5					S4			10	2	3
5		R8	R8	R8	R8		R8	R8			
6	S5					S4				11	3
7	S5					S4				12	3
8	S5					S4					13
9	S5					S4					14
10		S6	S7				S15				
11		R1	R1	S8	S9		R1	R1			
12		R2	R2	S8	S9		R2	R2			
13		R4	R4	R4	R4		R4	R4			
14		R5	R5	R5	R5		R5	R5			
15		R7	R7	R7	R7		R7	R7			