Assignment -1

Ans.1 A stack is a linear data structure that follows the LIFO principle. It means that the element which is added last is the one to be removed first.

Algorithm to convert Infix to prefix expression
1) create an empty stack to store operators
2) create an empty string to store output
3) reverse the Infix expression
4) for each character in the reversed Infix expression
   a) if it an operand, add it to the output
   b) if it a closing parenthesis ')', push it to the stack
   c) if it an opening parathesis '(', pop and add operators from the stack to the output until a closing parathensis is encountered

   d) if it is an operator, the Top element has heigher precedence, then push it

      if it has lower precedence or equal, pop the elements from the stack and add to the output string until an operator with lower precedence or if until the stack becomes empty, then push the current operator

5) reverse the output

Infix expression - "$2+3*(4-1)$"

Reverse the expression → $)1-4(*3+2$

character	stack	output string
)	)	
1	)	1
-	)-	1
4	)-	14
(		14-
*	*	14-
3	*	14-3
+	* +	14-3
2	* +	14-32
		14-32+*

reverse the expression

$* + 23 - 41$

Ans 2

(1) $(A+B)/(C-D*E)$

Expression	stack	output
(	C	
A	(	A
+	C+	A
B	C+	AB
)		AB+
/	/	AB+

Expression	Stack	Output
C	/C	AB+
C	/C	AB+C
–	/C–	AB+C
D	/C–	AB+CD
*	/C–*	AB+CD
E	/C–*	AB+CDE
)	/	AB+CDE*–

=> $AB+CDE*-/$

② $A* C/D - E*F$

Expression	Stack	Output
A		A
*	*	A
C	*	AC
/	/	AC*
D	/	AC*D
–	–	AC*D/
E	–	AC*D/E
*	–*	AC*D/E
F	–*	AC*D/EF

=> $AC*D/EF*-$

③ $A^B^C -D/E$ → $AB^C^DE/-$

④ $A|B+C/D*E$ → $AB/CD/E*+$

Ans3

(A) $5\ 4\ 6\ +\ ^*\ 4\ 9\ 3\ /\ +\ ^*$

expression	stack
5	5
4	5 4
6	5 4 6
+	5, 10
*	50
4	50, 4
9	50, 4, 9
3	50, 4, 9, 3
/	50, 4, 3
+	50, 4, 7 50, 7
*	350

Ans = 350

(B) $5\ 6\ 2\ +\ ^*\ 4\ 3\ /\ -$

expression	stack
5	5
6	5, 6
2	5, 6, 2
+	5, 8
×	40
9	40, 9
3	40, 9, 3
/	40, 3
-	37

Ans = 37

c) &45 42 ^ + * 22 ^ 9 3 / * -

Expression	stack
4	4
5	4, 5
4	4, 5, 4
2	4, 5, 4, 2
^	4, 5, 16
+	4, 21
*	84
2	84, 2
2	84, 2, 2
^	84, 4
9	84, 4, 9
3	84, 4, 9, 3
/	84, 4, 3
*	84, 12
-	72

⇒ Ans = 72

d) 5 6 7 + * 8 -   ⇒ 57