



Alexandria University
— Faculty of Engineering —

Assignment NO. 2

By:

Ali Mohamed Taima Hummus

Question 1

a- $(2-3+4)*(5+6*7)$

$((2-3)+(4))*((5)+(6*7))$

prefix: $*+-234+5*67$

postfix: $23-4+567*+*$

Character scanned	stack
2	2
3	2 3
-	-1
4	-1 4
+	3
5	3 5
6	3 5 6
7	3 5 6 7
*	3 5 42
+	3 47
*	141

b- $2-3+4-5*6$

$((2-3)+(4))-(5*6)$

Prefix: $--234*56$

Postfix: $23-4+56*-$

Character scanned	stack
2	2
3	2 3
-	-1
4	-1 4
+	3
5	3 5
6	3 5 6
*	3 30
-	-27

c- $((H*(((A+((B+C)*D))*F)*G)*E))+J$

$((H*(((A+((B+C)*D))*F)*G)*E))+J$

Prefix: $+*H***+A*+BCDFGEJ$

Postfix: $HABC+D*+F*G*E**J+$

Character scanned	stack	Assumption
H	H	
A	H A	
B	H A B	
C	H A B C	SUM of B&C = K
+	H A K	
D	H A K D	MUL of X&D = L
*	H A L	SUM of A&L = M
+	H M	
F	H M F	MUL OF M&F = N
*	H N	
G	H N G	MUL(N, G) = O
*	H O	
E	H O E	MUL(O, E) = P
*	H P	MUL(H,Q) = Q
*	Q	
J	Q J	SUM(R, J) = R
+	R	

$$a - (12 - 3 + 4) * (5 + (6 * 7))$$

Postfix:-

$$(123-) + 4) (5 + (67 *))$$

$$(123 - 4 +) * (567 * +)$$

$$(123 - 4 + 567 * + *)$$

Prefix:-

$$((1 - 23) + 4) * (5 + (6 * 7))$$

$$\frac{(1 + A4)}{C} * \frac{(1 + 5B)}{D}$$

$$*CD = * + A4 + 5B$$

$$= * + -234 + 5 * 67$$

$$b - ((2 - 3) + 4) - (5 * 6)$$

Postfix:-

$$((23-) + 4) - (56*)$$

$$(23 - 4 +) - (56 *)$$

$$23 - 4 + 56 * -$$

Prefix:-

$$(-(23) + 4) - (1 * 56)$$

$$(1 + -234) - (1 * 56)$$

$$- + -234 * 56$$

$$c - ((H * (((A + ((B + C) * D)) * F) * G) * E) * J)$$

Postfix:-

$$BC +$$

$$BC + D *$$

$$ABC + D * +$$

$$ABC + D * + F -$$

$$ABC + D * + F * G *$$

$$ABC + D * + F * G * E *$$

$$HABC + D * + F * G * E * *$$

$$(HABC + D * + F * G * E * * J +)$$

Prefix:-

$$((H * (((A + ((B + C) * D)) * F) * G) * E) * J)$$

$$+ BC$$

$$* + BCD$$

$$+ A * + BCD$$

$$* + A * + BCD F$$

$$* * + A * + BCD FG$$

$$* * * + A * + BCD FG$$

$$* H * * * + A * + BCD FG$$

$$+ * H * * * + A * + BCD FG$$

d- $2*3 + 4*5$

Prefix: $+*23*45$

Postfix: $23*45*+$

Character scanned	stack
2	2
3	2 3
*	6
4	6 4
5	6 4 5
*	6 20
+	26

e- $(A*(B*(((C+A)+B)*C)))$

Prefix: $*A*B*++CABC$

Postfix: $ABCA+B+C***$

Character scanned	stack	Assumption
A	A	
B	A B	
C	A B C	
A	A B C A	SUM(C,A)=D
+	A B D	
B	A B D B	SUM(D,B)=E
+	A B E	
C	A B E C	MUL(E, C)=F
*	A B F	MUL(B, F)=G
*	A G	MUL(A, G)=H
*	H	

d. $2 \times 3 + 4 \times 5$
 Post: $(2 \times 3) + (4 \times 5)$
 $(23 \times) + (45 \times)$

$(23 \times 45 \times +)$

Prefix: $+$

$(2 \times 3) + (4 \times 5)$

$(\times 23) + (\times 45)$

$+ \times 23 \times 45$

e- $A * (B * (((C + A) + B) * C))$

Postfix

$CA +$

$CA + B +$

$CA + B + C \times$

$BCA + B + C \times \times$

$ABCA + B + C \times \times \times$

$A * (B * (((C + A) + B) * C))$

$+ CA$

$+ \times CAB$

$\times \times \times CAB$

$\times B \times \times \times CAB$

$\times A \times B \times \times \times CAB$

Question 2

There is a '(' in below operators in the stack so the operators above it, are in the '(' it self (-*

And the remaining expression is "+ f) / g"

So the total infix expression is "(-*+f)/g"

To know the operands for these operators, we should pop elements from the postfix string stack "a b - c d e", as we see we need 3 operands

So we pop first two elements(d e) for * operation and third for –

- the final expression is (c-d*e+f)/g and we should take into a count the + operation that become before the '(' but we should know the other operand for it beside (c-d*e+f)/g
 - To know the other operand we will pop the remaining in the postfix string stack
 - We find it "ab-"
- So the total infix expression is: (a-b) +((c-d*e+f)/g)
 - (ab-)+((c-(de*))+f)/g)
 - (ab-)+(((cde*-)+f)/g)
 - (ab-)+((cde*-f+)/g)
 - (ab-)+(cde*-f+g/)
 - ab-cde*- f+g/+

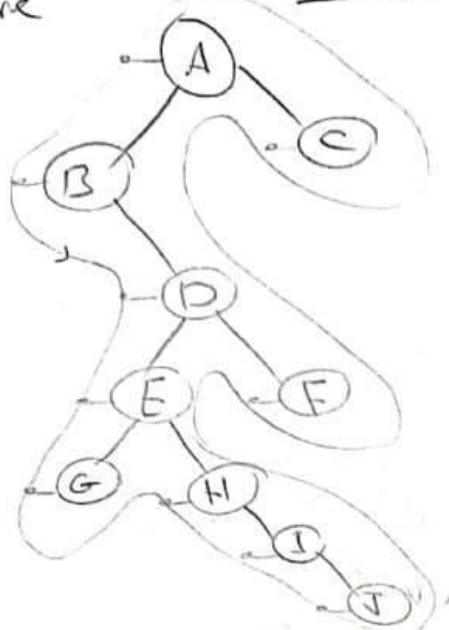
The final postfix expression is: **ab-cde*- f+g/+**

Question 3

Q13)

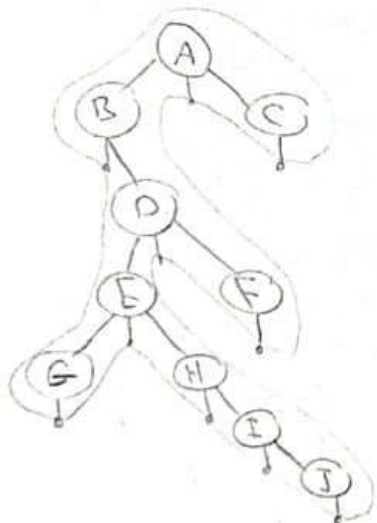
Pre

Tree 1



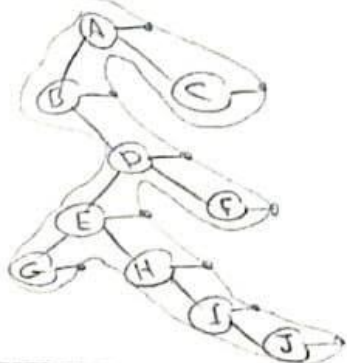
ABDEGHIJFC

In



BG EHIJDFAC

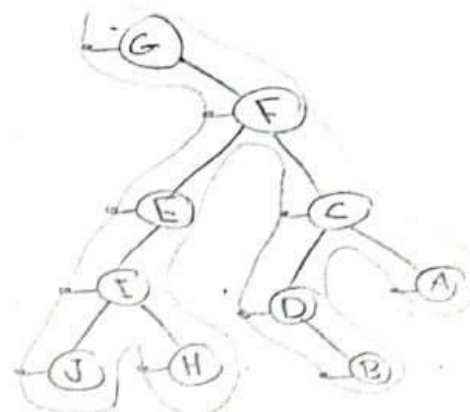
Post



GJ I H E F D B C A

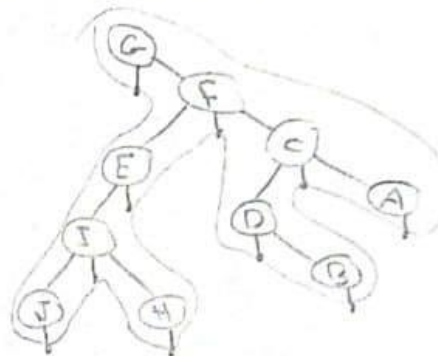
Tree 2

Pre

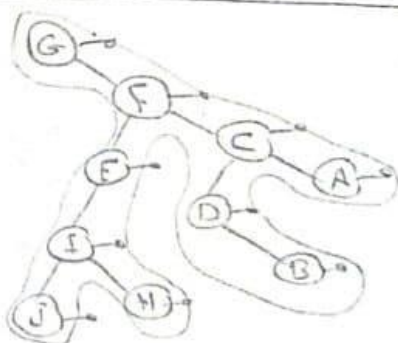


GFEI JH CDBA

In



G J I H E F D B C A

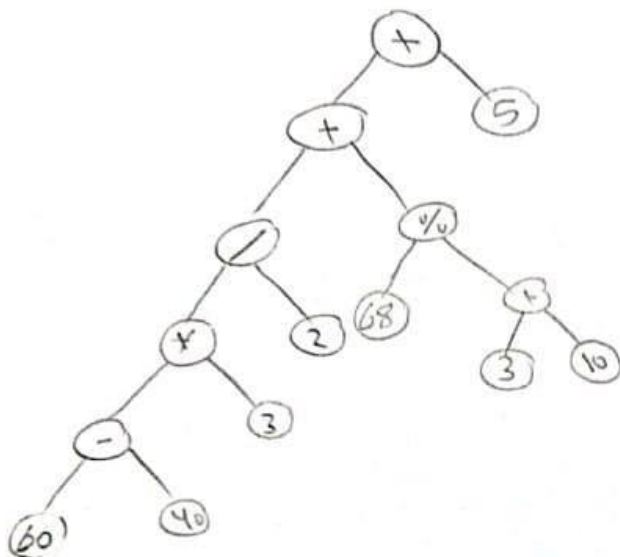


J H I E B D A C F G

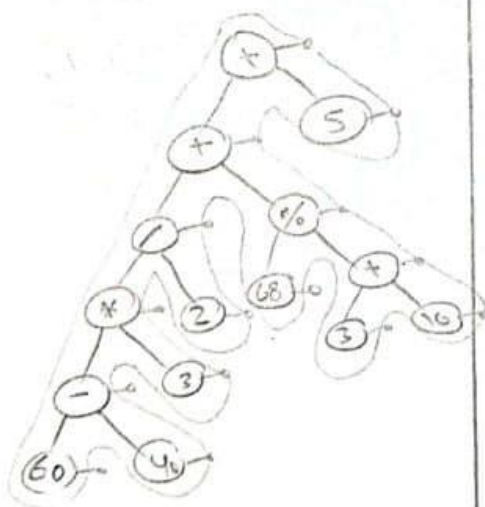
Question 4

Q4

a

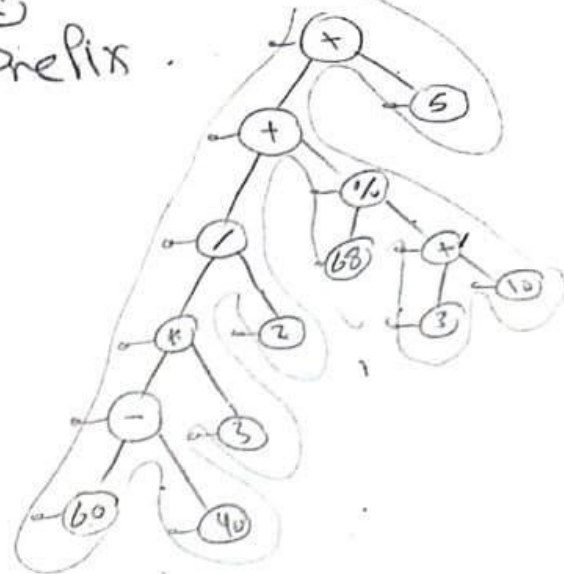


b
Prefix



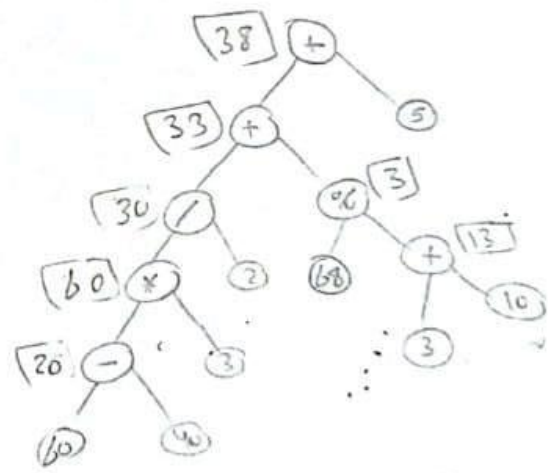
$60 \ 40 \ - \ 3 \ * \ 2 \ / \ 68 \ 3 \ 10 \ + \ \% \ + \ 5 \ +$

c
Prefix



$++ \ / \ * \ - \ 60 \ 40 \ 3 \ 2 \ \% \ 68 \ + \ 3 \ 10 \ 5$

d



verification with infix
 $(60 - 40) * 3 / 2 + 68 \% (3 * 10) + 5$
 $20 * 3 / 2 + 68 \% 13 + 5$
 $60 / 2 + 3 * 5$
 $30 + 3 * 5$
 $= 38$