

Lab3.4 Q2(c)-Q10

Name: YUEN Yiu Yeung

StudentNo:200171873

Class:IT114105/1C

Declaration:

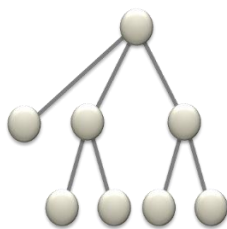
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Q2(c)

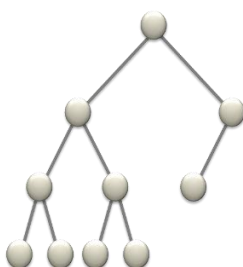
Word to search for	Results	Time needed (BST)	Time needed (linked list)
water	<input checked="" type="checkbox"/> Found <input type="checkbox"/> Not Found	10300	333500
ever	<input checked="" type="checkbox"/> Found <input type="checkbox"/> Not Found	26700	17000
snail	<input type="checkbox"/> Found <input checked="" type="checkbox"/> Not Found	9200	165900
better	<input type="checkbox"/> Found <input checked="" type="checkbox"/> Not Found	7400	98300
apple	<input checked="" type="checkbox"/> Found <input type="checkbox"/> Not Found	8600	72900
door	<input checked="" type="checkbox"/> Found <input type="checkbox"/> Not Found	11200	267900
foolish	<input checked="" type="checkbox"/> Found <input type="checkbox"/> Not Found	10600	85500

Q3.

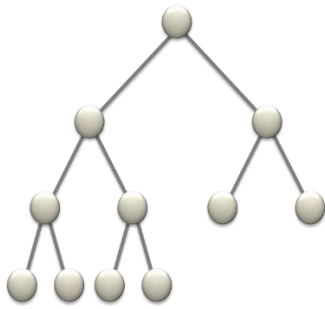
- A general tree



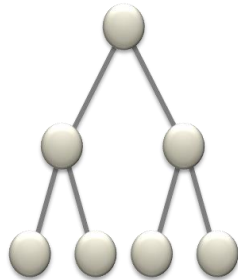
- A binary tree



- A proper binary tree



- A complete binary tree



Q4.

Number of leaf nodes = $N / 2 + 1$

Number of non-leaf nodes = $N / 2$

Q5.

Total number nodes in the tree: $2^{8+1} - 1 = 511$

Let d be the depth

Total number of nodes of a complete binary tree: $2^{d+1} - 1$

$d = \log_2(\text{Total number of nodes} + 1) - 1$

Q6.

(a)

0	1	2	3	4	5	6	7	8	9
Q	B	U		G	R	W			E
10	11	12	13	14	15	16	17	18	19
J									
20	21	22	23	24	25	26	27	28	29
F	I	P							
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
			H						

50	51	52	53	54	55	56	57	58	59

60	61	62

(b)

(i) pre-order traversal: Q B G E F J I H P U R W

(ii) in-order traversal: B E F G H I J P Q R U W

(iii) post-order traversal: F E H I P J G B R W U Q

Q7. (Attached scan photo of hand-writing)

Q8.

BinaryNode search (BinaryNode t, key x)

begin

 if t is null

 return null;

 if (x is less than t.data.key)

 return search (t.left, x);

 else if (x is greater than t.data.key)

 return search (t.right, x);

 else

 return t;

end

Q9.

7(a) is an ordinary binary tree

7(b) is a complete binary tree

7(c) is an almost complete binary tree (non-strictly)

7(d) is an almost complete binary tree (strictly)

7(e) is a binary tree of N nodes with depth N-1. All non-leaf nodes only have a right son. In fact, it is similar to a linear list.

7(f) is same as (e) where non-leaf nodes only have a left son.

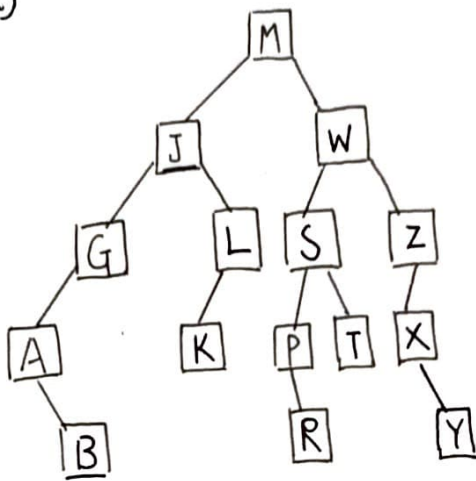
Q10.

Postfix expression: A B + C * D E + / F *

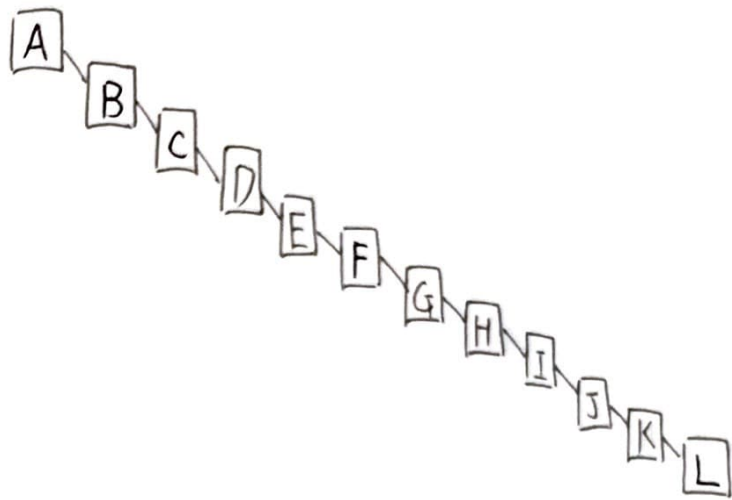
Reason: (Attached scan photo of hand-writing)

Prefix expression: * / * + A B C + D E F

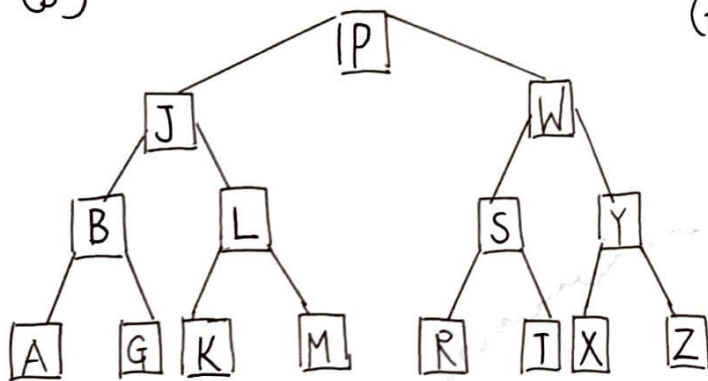
7(a)



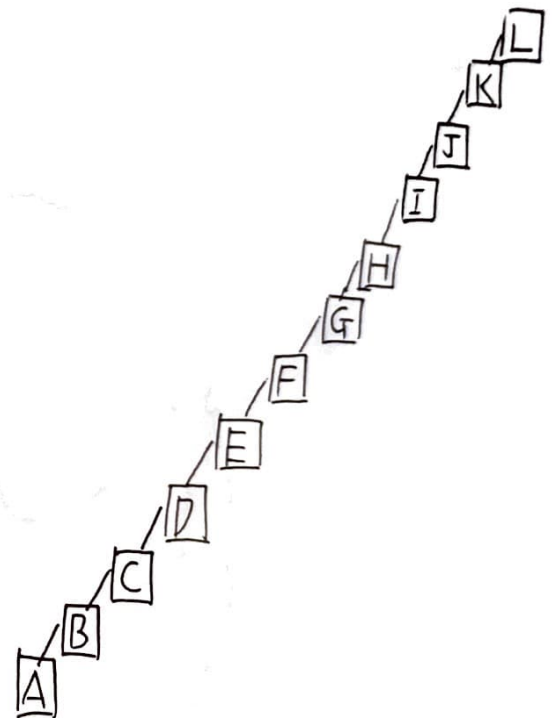
(e)



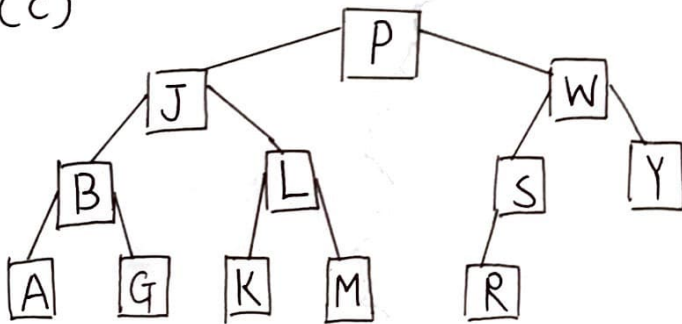
(b)



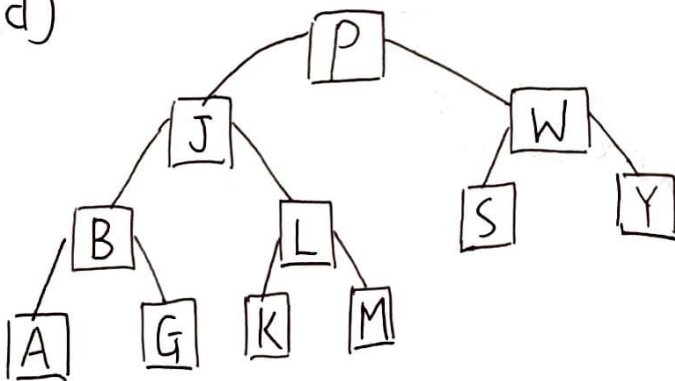
(f)



(c)



(d)



10. Expression tree

