Student Name: _____ Student ID: _____

THE HONG KONG POLYTECHNIC UNIVERSITY

DEPARTMENT OF COMPUTING

EXAMINATION

Course : Broad Discipline of COMP-61431, BSc Data Science & Analytics-63428-SYD, BEng EE-41470

Subject : COMP2011 Data Structures

Group : 1011, 1012, 172, 181

Session : 2022 / 2023 Semester I

Date : 06 December 2022 Time : 15:15 - 18:15

Time Allowed: 3 Hours Subject Lecturer: Dr CAO Yixin

This question paper has 7 pages.
(Some pages may be intentionally omitted.)

Instructions to Candidates:

If you run out of space, you can use the back of the pages; please indicate clearly.

Unless explicitly stated otherwise,
a linked list does not have a tail reference,
a heap is a maximum heap,
we sort from the smallest to the largest,
bubble sort has a flag, and
selection sort deals with the smallest elements.

Do not turn this page until you are told to do so!

相同去
左边

2. (25 points) Fill in the blank space.

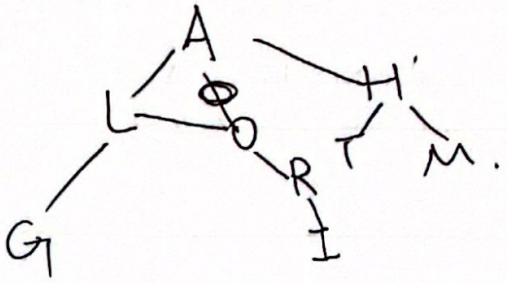
(a) (4 points) We use algorithms selection sort and heapsort to sort the arrays [6, 6, 6] and [2, 0, 1, 1]. Are they stable? Please fill out the table with T/F.

	[6, 6, 6]	[2, 0, 1, 1]
selection sort	✓	✓
heapsort	✓	✓

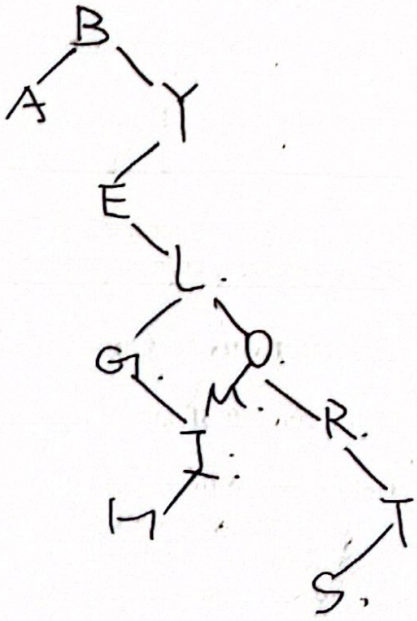
(b) (5 points) Draw the binary tree whose preorder sequence is "ALGORITHM" and inorder sequence is "GLORIAHTM."

(c) (4 points) Insert the thirteen letters of the word "BYE ALGORITHMS" into an empty binary search tree. Draw the results.

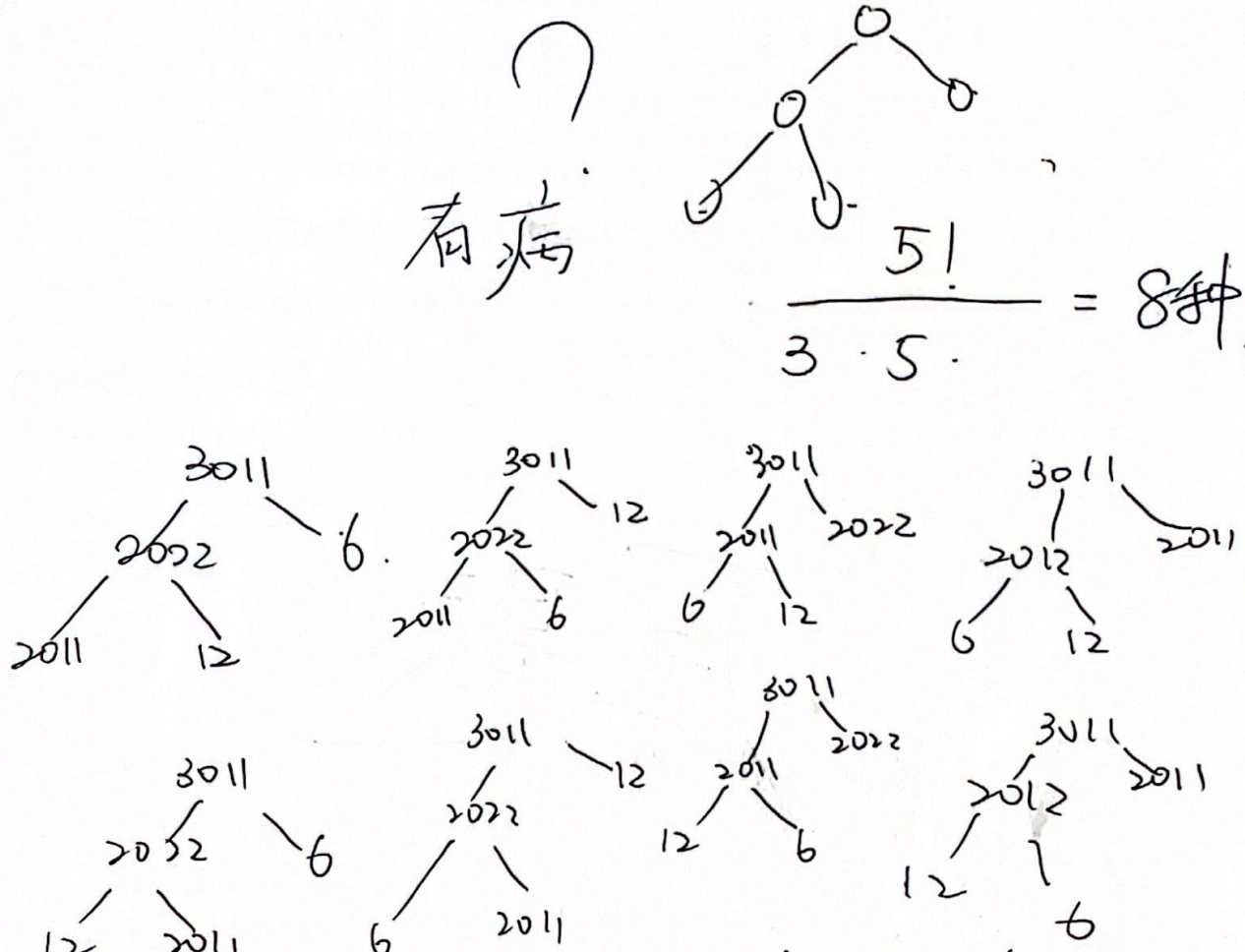
(b)



(c)



(d) (4 points) Draw all possible maximum heaps on 2011, 3011, 2022, 12, 6.



8 9 10 11 12 13 14
H I J K L M N
15 16 0 1 2 3
O P Q R S T

(e) (8 points) Consider a hash table with table size $M = 17$. It uses the hash function $h(c) = (c - \text{'A'} + 1)\%17$ and the open addressing with linear probing to resolve collisions. Fill out the table after the following operations:

- insert the ten letters in "ALGORITHMS" in order (the letter 'A' has already been inserted);
- remove letters 'I' and 'O';
- insert the three letters in "BYE" in order.

	A	R	T	S	B	E	G	H	I			L	M	O		
0				4				8			12				16	

The longest cluster consists of _____ elements.

这啥
25 (8) ?
没学
假装
后面
写一个

4.