1. (20%) Provide a procedure to build a **binary heap** in O(*N*) when given *N* integers. Prove the correctness of your answer.

2. (20%) Create a data structure that efficiently supports the **stack** operations (**push** and **pop**) and also a **return-the-minimum** operation. Assume the elements are real numbers so that you can compare them.

3. (20%) Given the root of a **binary tree** where each node contains a key, write a pseudocode program to determine whether it is a **binary search tree (BST)**. You can use extra space proportional to the height of the tree.

   Note: A node in a **BST** has two pointers, named 'left' and 'right', respectively, where the 'left' pointer is used to find the left child of the node and the 'right' pointer is used to find the right child.

4. (20%) Please write a pseudocode function that deletes a key (the input of the function) in a **binary search tree (BST)**.

   Note: A node in a **BST** has two pointers, named 'left' and 'right', respectively, where the 'left' pointer is used to find the left child of the node and the 'right' pointer is used to find the right child.

5. (20%) Write a pseudocode program to transform an **infix** expression to **postfix** expression.
   *Input example:* ( 5 * ( ( 9 * 8 ) + ( 7 * ( 4 + 6 ) ) ) ). We assume that the integers and operators are delimited by a single blank.

試題隨卷繳回