1. (20%) Write a pseudocode function that takes the head node of a **double linked list** as input and returns the largest item (value) in the double linked list. Before returning, your function should remove all the nodes with that value from the double linked list.
   Note: A node in a **double linked list** has two pointers, named 'next' and 'prev', respectively, where the 'next' pointer is used to find the next node and the 'prev' pointer is used to find the previous node.

2. (20%) Given an undirected graph containing N nodes (vertices), of which the edges connecting two nodes can be added from time to time, please (a) design a data structure that can be used to dynamically answer whether two nodes are connected (directly or indirectly) **in logarithmic time**; (b) prove the correctness of your solution.

3. (20%) Assume that you have used a **heap** to implement a **MIN priority queue**. Please design a mechanism that can decrease the priority (key) of an entry in the priority queue **in logarithmic time**.

4. (20%) Please implement the put (insert) function of a **binary search tree (BST)** that maintains the symmetric order based on the *keys* of the entries. Assume that each entry has a single key, and all the keys are distinct.
   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%) (a) Please implement a pseudocode function that performs the nearest neighbor search in a ***k*-d tree** with k=2 (find the closest point among N 2-dimensional points to the query point). (b) Analyze the complexity of your code.

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