CSCI 3333 Practice Quiz TREE2

Problem 1. Fill in the blanks regarding the worst-case running times for the following algorithms and functions on a binary search tree with \( n \) nodes and height \( h \).

- The running time of insertion is \( \Theta(\text{function of } n \text{ and } h) \).

- The running time of function \texttt{max} in Problem 1 of pqTREE1 is \( \Theta(\text{function of } n \text{ and } h) \).

- The running time of function \texttt{after} in Problem 2 of pqTREE1 is \( \Theta(\text{function of } n \text{ and } h) \).

- The running time of function \texttt{fill_sorted} in Problem 3 of pqTREE1 is \( \Theta(\text{function of } n \text{ and } h) \).

Problem 2. Determine the truth of the following statements about BSTs with \( n \) nodes and height \( h \).

The worst-case time of searching is \( \Theta(n + h) \).  □ True  □ False

The worst-case time for printing all elements is \( \Theta(n) \).  □ True  □ False

The worst-case time for insertion is \( \Theta(\log(n)) \).  □ True  □ False

\( \log_2(n) \leq h \leq n \).  □ True  □ False
Problem 3. Complete the following template function that prints only the internal nodes of a BST.

```cpp
template <typename T>
void print_internal_nodes(Node<T>* root)
{
    if (root == nullptr)
        _____;

    if (root->left _____ _____)
        cout << root->x << endl;

    else if (root->right _____ _____)
        cout << root->x << endl;

    print_internal_nodes(root->left);
    print_internal_nodes(root->right);
}
```

For a tree with $n$ nodes, the running time of `print_internal_nodes` is $\Theta(\text{function of } n \text{ and } h)$. 