

Quiz 1 Solutions

P1: (a) $O(n^2 \log^2 n)$ (b) $O(N)$ (c) $O(\log n)$ (d) $O(n^n)$

For the factorial case, remember $n!$ grows faster than k^n but slower than n^n . $n! = n * (n - 1) * (n - 2) \dots$, and $n^n = n * n * n \dots$

```
// Function to check if brackets are balanced
bool areBracketsBalanced(string expr)
{
    // Declare a stack to hold the previous brackets.
    stack<char> temp;
    for (int i = 0; i < expr.length(); i++) {
        if (expr[i] != '(' and expr[i] != ')') { // ignore other characters
            continue;
        }
        if (temp.empty()) {

            // If the stack is empty
            // just push the current bracket
            temp.push(expr[i]);
        }
        else if (temp.top() == '(' && expr[i] == ')') {

            // If we found any complete pair of bracket
            // then pop
            temp.pop();
        }
        else {
            temp.push(expr[i]);
        }
    }
    if (temp.empty()) {

        // If stack is empty return true
        return true;
    }
}
```

```
    }  
    return false;  
}
```

P3: The height is 3.

P4: Rule 1: Every node is either red or black Rule 2: The root is black Rule 3: Every leaf (NIL) is black Rule 4: If a node is red, then both its children are black Rule 5: For each node, all simple path from the node to descendant leaves contains the same number of black nodes