1. Recursive Analysis and BSTs

1.1. Recursive Analysis

For the following two methods, give the tight $\Theta(\cdot)$ worst-case bound for the runtime.

**Hint:** Draw out the tree for a sample $n$ value!

(a) $a(n)$

```plaintext
if (n <= 0) {
    return 1;
}
return 2 * a(n - 1) + 1;
```

$\Theta(\cdot)$:

(b) $b(n)$

```plaintext
if (n <= 1) {
    return 1;
}
return 5 + 2*b(n/2);
```

$\Theta(\cdot)$:

**Solution:**

(a) $\Theta(N)$

(b) $\Theta(\log(N))$

1.2. BSTs

Is the following tree a BST?

- [ ] Yes
- [ ] No
Solution:

(a) Yes

(b) No