QuickCheck 03: Solutions

Due: 8:00 am on Thursday, Jan 23, 2020

QuickChecks must be scanned and submitted online via Gradescope. If you have a smartphone, you can follow these steps to scan using an app: https://www.gradescope.com/help#help-center-item-student-scanning. Otherwise, there are scanners located at various libraries on campus which can be found here: https://finance.uw.edu/c2/printing-copying/dawg-prints-copy-locations. Make sure that the gray border around the edge of this page is visible in your scanned document.

1. Recursive Analysis and BSTs

1.1. Recursive Analysis

For the following two methods, give the tight $\Theta\left(\cdot\right)$ worst-case bound for the runtime.
Hint: Draw out the tree for a sample n value!

(a)
```
a(n) {
    if (n <= 0) {
        return 1;
    }
    return 2 * a(n - 1) + 1;
}
```
$\Theta\left(\cdot\right)$:

(b)
```
b(n) {
    if (n <= 1) {
        return 1;
    }
    return 5 + 2*b(n/2);
}
```
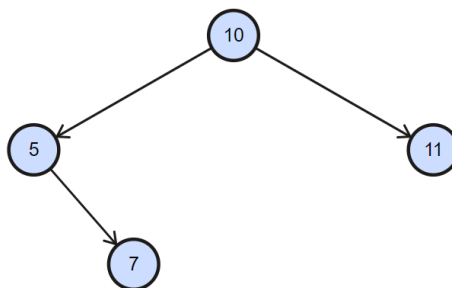$\Theta\left(\cdot\right)$:

Solution:

(a) $\Theta\left(N\right)$

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

1.2. BSTs

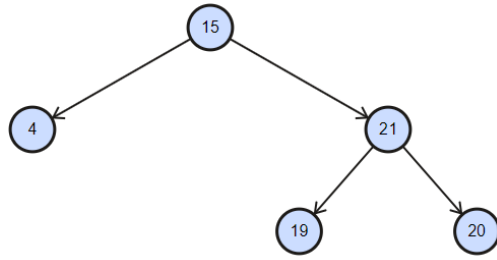Is the following tree a BST?

○ Yes   ○ No

○ Yes   ○ No

Solution:

(a) Yes

(b) No