Quiz 7

What is used?

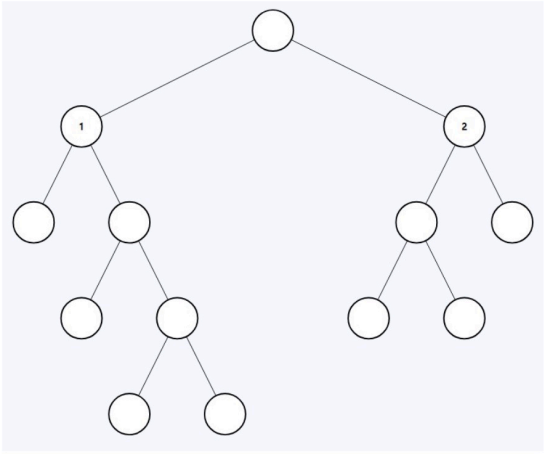
1)

True or false: In a *sorted* linked list, the search operation (as implemented in the lecture) has runtime $O(\log n)$.

Select one:

- True
- False

2)



In the binary tree above two nodes are labeled. Which of the labeled nodes satisfy the AVL condition?

Select one:

a. The node labeled 1
b. The node labeled 2
c. Both
d. Neither

3)

True or false: An important downside of bottom-up programs compared to programs using top-down recursion is that their runtime is worse.

Select one:

- True
- False

4)

Consider the pseudocode snippet below, which implements a function $\mathrm{Fib}(n)$ which computes the n-th Fibonacci number.

```
Fib(n):
    if n ≤ 2:
        f ← 1
    else:
        f ← Fib(n − 1) + Fib(n − 2)
    return f
```

True or false: The runtime $T(n)$ of the function $\mathrm{Fib}(n)$ implemented above satisfies $T(n) \geq \Omega(n^{100})$.

Select one:

- True
- False

5)

Recall the *Jump Game* from the lecture: Given an array $A[1 \ldots n]$ of positive integers, we want to find the minimum number of *jumps* needed to reach position n starting from position 1. In each jump, we are allowed to move at most $A[i]$ steps forward, where i is our current position.

In the lecture, you saw multiple ways of solving this problem by defining a *subproblem* and a *recursive formula*.

Consider the *subproblem:* $S[i] := \text{Minimum number of jumps needed to reach position } i$.

Which of the following *recursive formulas* correctly computes $S[i]$?

Select one:

a. $S[i] = \max\{j + A[j] \mid 1 \leq j \leq S[i-1]\}$
b. $S[i] = \min\{1 + S[j] \mid 1 \leq j < i \text{ and } j + A[j] \geq i\}$
c. $S[i] = \min\{j + A[j] \mid S[i-2] \leq j \leq S[i-1]\}$