

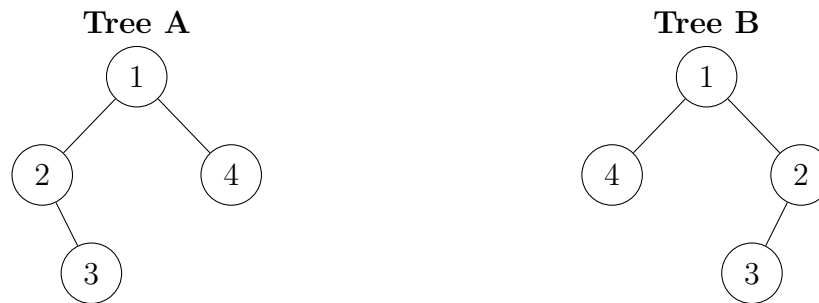
Quiz 6

Name: _____
NetID: _____

Question (5 points):

Say we implement `equals` for `LinkedBinaryTree<E>` such that two trees are considered equal if they have the same set of elements at the same depths — that is, the left-right order of children does not matter, only the elements that appear at each depth.

For example, the following two trees are considered equal:



Both trees contain the same elements at each depth:

Depth 0: {1}

Depth 1: {2, 4}

Depth 2: {3}

Thus, `Tree A.equals(Tree B) = true`.

Implement a method `hashCode()` for `LinkedBinaryTree<E>` that respects this definition of equality and “behaves as a random function,” as discussed in class. Your implementation should also be efficient and must run in $O(n)$ time, where n is the number of elements in the tree.

Definition:

- `equals(Object o)` — Returns `true` if this object is equal to another object based on the defined equality rule.
- `hashCode()` — Returns an integer hash value that must be identical for any two objects that are considered equal.