Algorithm successor (r, k)

In: Root r of a binary search tree, key k
Out: Node storing the successor of k, or null if k has no successor

if r is a leaf then return null
else {
    p ← get(r, k) \( \in O(\text{height}) \)
    if (p is an internal node) and (right child of p is internal) then
        return smallest (right child of p)
    else {
        p′ ← parent of p
        while (p′ ≠ r) and (p is the right child of p′) do
            if p = r then return null
            else return p′
    }
}

f(n) is \( O(\text{height}) = O(\log n) \)