A easy solution is O(n) time and O(n) space using a stack

```
def verifyPreorder(self, preorder):
    stack = []
    lower = -1 << 31
    for x in preorder:
        if x < lower:
            return False
        while stack and x > stack[-1]:
            lower = stack.pop()
        stack.append(x)
    return True


# 59 / 59 test cases passed.
# Status: Accepted
# Runtime: 100 ms
# 95.31%
```

Then we realize that the preorder array can be reused as the stack thus achieve O(1) extra space, since the scanned items of preorder array is always more than or equal to the length of the stack.

```
def verifyPreorder(self, preorder):
    # stack = preorder[:i], reuse preorder as stack
    lower = -1 << 31
    i = 0
    for x in preorder:
        if x < lower:
            return False
        while i > 0 and x > preorder[i - 1]:
            lower = preorder[i - 1]
            i -= 1
        preorder[i] = x
        i += 1
    return True


# 59 / 59 test cases passed.
# Status: Accepted
# Runtime: 112 ms
# 70.31%
```

python stack solution