1. Formulate the recursion relation for the following pseudo-code and analyze its time complexity.

```plaintext
function merge_sort(m)
    var list left, right, result
    if length(m) ≤ 1
        return m
    // This calculation is for 1-based arrays. For 0-based, use length(m)/2 - 1.
    var middle = length(m) / 2
    for each x in m up to middle
        add x to left
    for each x in m after middle
        add x to right
    left = merge_sort(left)
    right = merge_sort(right)
    result = merge(left, right)
    return result
```