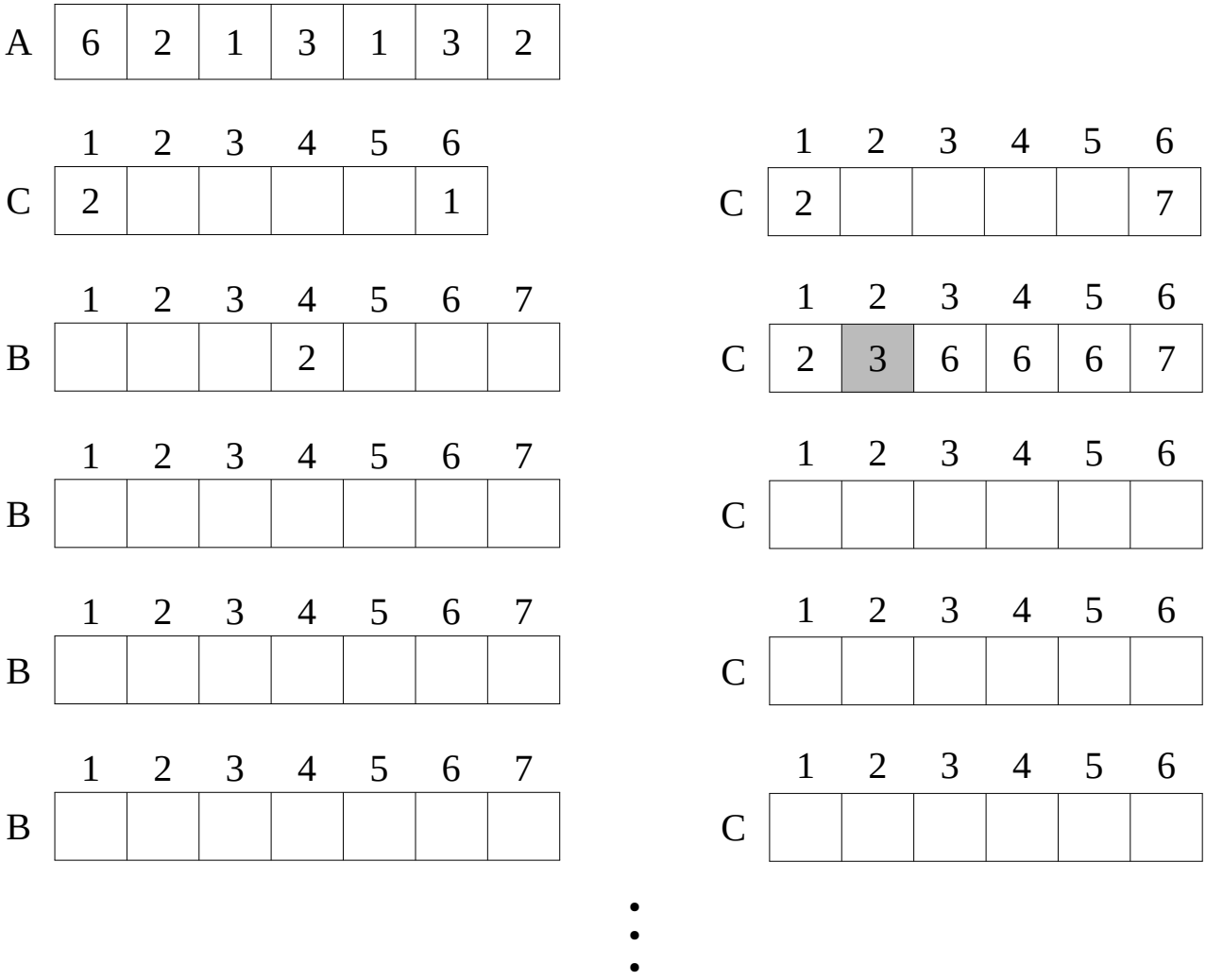
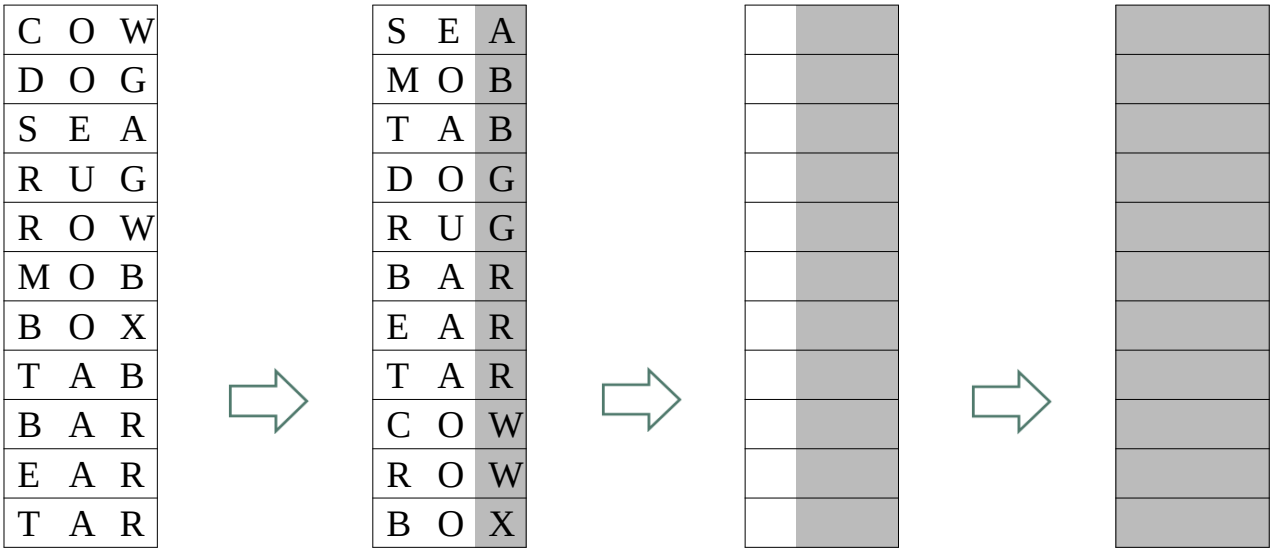
Review 7

1. Illustrate the operation of COUNTING-SORT on the array A={6,2,1,3,1,3,2}.



2. Fill in the following RADIX-SORT example.



3. Stack depth for quicksort

```
TAIL-RECURSIVE-QUICKSORT(A, p, r)
    while p < r
        // Partition and sort left subarray
        q = PARTITION(A, p, r)
        TAIL-RECURSIVE-QUICKSORT(A, p, q − 1)
        p = q + 1
```

a. Argue that TAIL-RECURSIVE-QUICKSORT(A, 1, $A.length$) correctly sorts the array A.

b. Describe a scenario in which TAIL-RECURSIVE-QUICKSORT′s stack depth is $\Theta(n)$ on n-element input array.

c. Modify the code for TAIL-RECURSIVE-QUICKSORT so that the worst-case stack depth is $\Theta(\lg n)$. Maintain the $O(n \lg n)$ expected running time of the algorithm.