Counting sort

Counting-sort(A, B, k): Given input array A and k such that $0 \leq A[i] \leq k$ for all i $(1 \leq i \leq length(A))$, outputs the sorted permutation of A in array B.

Counting-sort(A, B, k):

1. % the following for-loop initializes counting array C:
2. for x from 0 to k do
3. $\quad C[x] \leftarrow 0$
4. end for
5. % the next for-loop makes each $C[x]$ be the number of i such that $A[i] = x$:
6. for i from 1 to length(A) do
7. $\quad C[A[i]] \leftarrow C[A[i]] + 1$
8. end for
9. % sum up: each $C[x]$ will be the number of i such that $A[i] \leq x$:
10. for x from 1 to k do
11. $\quad C[x] \leftarrow C[x] + C[x-1]$
12. end for
13. % now put each $A[i]$ into the right place:
14. for i from length(A) down to 1 do
15. $\quad B[C[A[i]]] \leftarrow A[i]$
16. $\quad C[A[i]] \leftarrow C[A[i]] - 1$
17. end for