

Bubble-sort (A, n)

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for ( $i \leftarrow 1$  to  $n-1$ ) -----  $C_1 \cdot n$ 
{
    for ( $j \leftarrow 1$  to  $n-i$ ) -----  $C_2 \cdot \sum_{i=1}^{n-1} (i) = \sum_{i=1}^{n-1} i$ 
    {
        if ( $A[j] > A[j+1]$ ) -----  $C_3 \cdot \sum_{i=1}^{n-1} (i-1)$ 
            swap =  $A[j]$  -----  $C_4 \cdot \sum_{i=1}^{n-1} (i-1)$ 
             $A[j] = A[j+1]$  -----  $C_5 \cdot \sum_{i=1}^{n-1} (i-1)$ 
             $A[j+1] = \text{swap}$  -----  $C_6 \cdot \sum_{i=1}^{n-1} (i-1)$ 
    }
}

```

$$T(n) = C_1 \cdot n + C_2 \cdot \sum_{i=1}^{n-1} i + C_3 \cdot \sum_{i=1}^{n-1} (i-1) + C_4 \cdot \sum_{i=1}^{n-1} (i-1) +$$

$$C_5 \cdot \sum_{i=1}^{n-1} (i-1) + C_6 \cdot \sum_{i=1}^{n-1} (i-1)$$

$$T(n) = C_1 \cdot n + C_2 \left[\frac{n(n-1)}{2} \right] + C_3 \cdot \left[\frac{(n-2)(n-1)}{2} \right] +$$

$$C_4 \cdot \left[\frac{(n-2)(n-1)}{2} \right] + C_5 \cdot \left[\frac{(n-2)(n-1)}{2} \right] + C_6 \cdot \left[\frac{(n-2)(n-1)}{2} \right]$$

$$T(n) = C_1(n-1) + C_2 \left[\frac{n(n-1)}{2} \right] + (C_3 + C_4 + C_5 + C_6) \left(\frac{(n-2)(n-1)}{2} \right)$$

+

$$T(n) = \underline{\underline{O(n^2)}}$$