Bubble Sort Introduction

ALGORITHM BUBBLESORT(A)
    //Input: an array $A[0..n-1]$
    for $i \leftarrow 0..n-2$ **do**
        for $j \leftarrow 0..n-2$ **do**
            if $A[j+1] < A[j]$ **then**
                swap $A[j+1]$ and $A[j]$

What are the basic operations of this algorithm?

How many times did these operations occur for an array of size 5?

How many times would they happen for an array of size 10?

How many times would they happen for an array of size n?

Let's think about how we can change the bounds of the inner loop to avoid making some comparisons we know will never result in swaps.

ALGORITHM IMPROVEDBUBBLESORT(A)
//Input: an array $A[0..n-1]$
for $i \leftarrow 0..n-2$ **do**
  for $j \leftarrow 0..$ ☐ **do**
    if $A[j+1] < A[j]$ **then**
      swap $A[j+1]$ and $A[j]$

In a lab exercise, you will analyze this improved version.