# Prob1:

1. Sometime it works, but not guarantee because there is no way to make sure the re-arrange will sort the array ever.
2. Best case: array already sorted,
3. running time O(1)
4. Non-stop
5. No

# Prob2:

# Prob3:

a.

private void bubbleSort1() {

int len = arr.length;

for (int i = 0; i < len; ++i) {

boolean hasSwap = false;

for (int j = 0; j < len - 1; ++j) {

if (arr[j] > arr[j + 1]) {

swap(j, j + 1);

hasSwap = true;

}

}

if (!hasSwap)

return;

}

}

b.

private void bubbleSort2() {

int len = arr.length;

for (int i = 0; i < len; ++i) {

for (int j = 0; j < len - (i + 1); ++j) {

if (arr[j] > arr[j + 1]) {

swap(j, j + 1);

}

}

}

}

c.Result:

1. 403 ms -> InsertionSort
2. 728 ms -> SelectionSort
3. 3314 ms -> BubbleSort2
4. 4395 ms -> BubbleSort1
5. 4516 ms -> BubbleSort