

## HW #3. Number of Inversions

(Due: 4/5/2015)

Given a sequence  $[A_0, A_1, \dots, A_{m-1}]$ , an inversion is an integer pair  $(i, j)$  such that  $i < j$  and  $A_i > A_j$  for  $i, j \in [0, m-1]$ . For instance, assume sequence  $[A_0, A_1, A_2, A_3, A_4] := [0, 1, 4, 3, 2]$ . There are a total of 3 inversions, which are  $(2, 3)$ ,  $(2, 4)$ , and  $(3, 4)$ .

In this homework, you are given  $N$  integer sequences. For each sequence, you need to determine the number of inversions.

Following are the input and output formats. We use `msgpack` to pack the data fields.

### input.txt

```
N
SEQ1
SEQ2
...
SEQN
```

$N$  : a 32 bit signed integer indicating the number of sequences

$SEQ_i$  : an array of 32 bit signed integer numbers

### output.txt

```
NUM_INVERSIONS1
NUM_INVERSIONS2
...
NUM_INVERSIONSN
```

$NUM\_INVERSIONS_i$  : a **64 bit** signed integer indicating the number of inversions  
for input sequence  $SEQ_i$