70087 12

Coursework 2

Submitters

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10/10. Very good. Clearly presented and carefully written. Well done.

Emarking

70087 Algorithms
Assessed Coursework

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1. Answer to Question 1.

```
1:  procedure COUNT_SORTED(A, B)
2:      i ← 0
3:      j ← 0
4:      count ← 0
5:      while i<A.length and j<B.length do
6:          if A[i]>B[j] then
7:              j ← j + 1
8:              count ← count + A.length − i
9:          else
10:             i ← i + 1
11:         end if
12:     end while
13:     return count
14: end procedure
```

2. Answer to Question 2.

```
1:  procedure COUNT_PAIRS(C)
2:      return MERGESORT(C, 0, C.length-1)
3:  end procedure
4:  procedure MERGESORT(C, low, high)
5:      count ← 0
6:      mid ← (low + high)/2
7:      if low<high then
8:          count ← count + MERGESORT(C, low, mid)
9:          count ← count + MERGESORT(C, mid + 1, high)
10:         count ← count + MERGE(C, low, mid, high)
11:     end if
12:     return count
13: end procedure
14: procedure MERGE(C, low, mid, high)
15:     count ← 0
16:     for i ← 0 to high − low + 1 do
17:         tmp[i] ← 0
18:     end for
```

```
19:     i ← low
20:     j ← mid + 1
21:     k ← 0
22:     while i ≤ mid and j ≤ high do
23:         if C[i] ≤ C[j] then
24:             tmp[k] ← C[i]
25:             k ← k + 1
26:             i ← i + 1
27:         else
28:             count ← count + (mid − i + 1)
29:             tmp[k] ← C[j]
30:             k ← k + 1
31:             j ← j + 1
32:         end if
33:     end while
34:     while i ≤ mid do
35:         tmp[k] ← C[i]
36:         k ← k + 1
37:         i ← i + 1
38:     end while
39:     while j ≤ high do
40:         tmp[k] ← C[j]
41:         k ← k + 1
42:         j ← j + 1
43:     end while
44:     for n ← 1 to tmp.length do
45:         C[n + low] ← tmp[n]
46:     end for
47:     return count
48: end procedure
```