Northern Michigan University (Marquette Co, MI)

CS422-01-25W: Algorithms (Andrew A. Poe) Name: _____
Quiz 3 Monday 7 February 2025 9:00 A.M. EST

Time: 15 minutes

Imagine that an array contains exactly eight distinct elements (no ties) in reverse order. Show how the merge sort, as we discussed it in class, would sort these elements into forward order. Exactly how many comparisons of two elements would merge sort make in this situation?

There are eight elements in the array: call them H G F E D C B A.

The array will be split into two groups of four. Each of those will be split into two groups of two. Each of those will be split into two groups of one.

Merging the H list to the G list will take one comparison: G < H.
The other three will also take one comparison each: E < F; C < D; A < B.
Total: 4

Merging the GH list to the EF list will take two comparisons: E < G; F < G.
Merging the CD list to the AB list will also take two comparisons: A < C; B < C.
Total: 8

Merging the EFGH list to the ABCD list will take four comparisons:
A < E; B < E; C < E; D < E

Total: 12