Question 2

The worst-case complexity of O(n log n) for the merge algorithm. The algorithms starts with the merge\_sort function which just divides the code into halves regardless of the size of the array. So the complexity of the merge\_sort would be O(1) since it takes a constant time. However since the function is called recursively that would result into the steps takes as log(n) where in this case the n would be the size of the array. The merge function has the complexity of O(n) since it iterates over the array once to see if the low and high indexes have sorted values. Furthermore the left and right array has an O(n) complexity since it just iterates over the array once and pastes the values based on the indexes. This means that the overall time complexity of the algorithm is O(n log n) since it take O(n) time for the merge function to be called and it takes O(log n) time for the recursion to be called . And since the algorithm runs regardless of the input array given, this means that this complexity is also the worst-case complexity.

Question 3

A drawing of a rectangular object with numbers

Description automatically generated

A drawing of a number

Description automatically generated

A whiteboard with black text

Description automatically generated

A whiteboard with black text and numbers

Description automatically generated

A diagram of numbers and a number

Description automatically generated with medium confidence

A white board with black writing

Description automatically generated

A diagram of numbers and a diagram of numbers

Description automatically generatedS

A diagram of numbers and a diagram of numbers

Description automatically generated

A diagram of numbers and a diagram of numbers

Description automatically generated

A diagram of a number

Description automatically generated

A diagram of numbers and a number

Description automatically generated with medium confidence

A diagram of numbers and a number

Description automatically generated with medium confidence

A diagram of a number

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A diagram of numbers and a number

Description automatically generated with medium confidence

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Description automatically generated with medium confidence

A diagram of numbers and a number

Description automatically generated with medium confidence

A diagram of a number

Description automatically generated with medium confidence

A diagram of a number

Description automatically generated

A diagram of a number

Description automatically generated with medium confidence

A diagram of a number

Description automatically generated

Question 4