

Merge Sort

Exercise

```
class Tester {

    public static void mergeSort(int[] elements, int size) {
        if (size < 2) {
            return; // Base case: if array has 0 or 1 element, it's already sorted
        }

        int mid = size / 2;
        int[] left = new int[mid];
        int[] right = new int[size - mid];

        // Fill left and right sub-arrays
        for (int i = 0; i < mid; i++) {
            left[i] = elements[i];
        }
        for (int i = mid; i < size; i++) {
            right[i - mid] = elements[i];
        }

        // Recursive calls to sort left and right sub-arrays
        mergeSort(left, mid);
        mergeSort(right, size - mid);

        // Merge the sorted left and right sub-arrays
        merge(elements, left, right, mid, size - mid);
    }
}
```

```
}
```

```
public static void merge(int[] elements, int[] left, int[] right, int leftMerge, int rightMerge) {
```

```
    int i = 0, j = 0, k = 0;
```

```
    // Compare elements from left and right sub-arrays and merge them into elements array
```

```
    while (i < leftMerge && j < rightMerge) {
```

```
        if (left[i] <= right[j]) {
```

```
            elements[k++] = left[i++];
```

```
        } else {
```

```
            elements[k++] = right[j++];
```

```
        }
```

```
    }
```

```
    // Copy remaining elements of left sub-array, if any
```

```
    while (i < leftMerge) {
```

```
        elements[k++] = left[i++];
```

```
    }
```

```
    // Copy remaining elements of right sub-array, if any
```

```
    while (j < rightMerge) {
```

```
        elements[k++] = right[j++];
```

```
    }
```

```
}
```

```
public static void displayArray(int[] elements) {
```

```
    for (int element : elements) {
```

```
        System.out.print(element + " ");
    }
    System.out.println();
}

public static void main(String[] args) {
    int[] elements = { 95, 56, 20, 98, 34, 77, 80 };

    System.out.println("Given Array:");
    displayArray(elements);

    mergeSort(elements, elements.length);

    System.out.println("Sorted Array:");
    displayArray(elements);
}
}
```

Output-

```
C:\Users\student\Desktop>java Tester1
Given Array:
95 56 20 98 34 77 80
Sorted Array:
20 34 56 77 80 95 98
```