Complexity of in-place mergesort is O(log n)

Merge sort has O(n)

And in-place sorting algorithm does not require creating space for any additional memory for sorting

Best case – log N
Worse case – log$_2$ N

```
  if(a[first]>a[last])
```

```
int temp = a[first];
```

```
int temp = a[first];
```

```
class MergeSort

{

    void merge(int arr[], int p, int m, int r)

    {

// Find sizes of 2 subarrays to be merged

        int num1 = m - p + 1;

        int num2 = r - m;

// Temp arrays initialized

        int L[] = new int [num1];

        int R[] = new int [num2];

// Copy data to temp arrays

        for (int a=0; a<num1; ++a)

            L[a] = arr[p + a];

        for (int b=0; b<num2; ++b)

            R[b] = arr[m + 1+ b];

// Merge the temp arrays
```

```
int temp = a[first];
```