QUESTION 1: Write a program to sort an array of elements in ascending order using merge-sort. calculate the CPU time.

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#include <stdio.h>
#include <time.h>
void merge(int arr[], int p, int q, int r) {
  int n1 = q - p + 1;
  int n2 = r - q;
  int L[n1], M[n2];
  int i,j;
  for (i = 0; i < n1; i++){
        L[i] = arr[p + i];
  }
  for ( j = 0; j < n2; j++){
        M[j] = arr[q + 1 + j];
  }
  int k;
  i = 0;
  j = 0;
  k = p;

  while (i < n1 && j < n2) {
    if (L[i] <= M[j]) {
      arr[k] = L[i];
      i++;
    } else {
      arr[k] = M[j];
      j++;
```

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    }
    k++;
  }

  while (i < n1) {
    arr[k] = L[i];
    i++;
    k++;
  }
  while (j < n2) {
    arr[k] = M[j];
    j++;
    k++;
  }
}
void mergeSort(int arr[], int l, int r) {
  if (l < r) {
    int m = l + (r - l) / 2;
    mergeSort(arr, l, m);
    mergeSort(arr, m + 1, r);
    merge(arr, l, m, r);
  }
}

void printArray(int arr[], int size) {
        int i;
  for (i = 0; i < size; i++)
```

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    printf("%d ", arr[i]);
  printf("\n");
}
int main() {
        clock_t start, end;
      double cpu_time_used;

      start = clock();
      int arr[] = {6, 5, 12, 10, 9, 1,13};
  int size = sizeof(arr) / sizeof(arr[0]);
  printf("unSorted array: \n");
  printArray(arr, size);
  mergeSort(arr, 0, size - 1);
  printf("Sorted array: \n");
  printArray(arr, size);
      end = clock();
        cpu_time_used = ((double) (end - start));

  printf("CPU time ==>:%f \n", cpu_time_used);
}
```

OUTPUT: