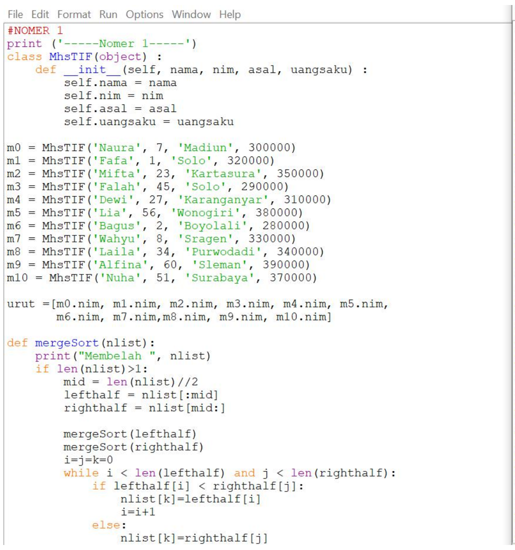
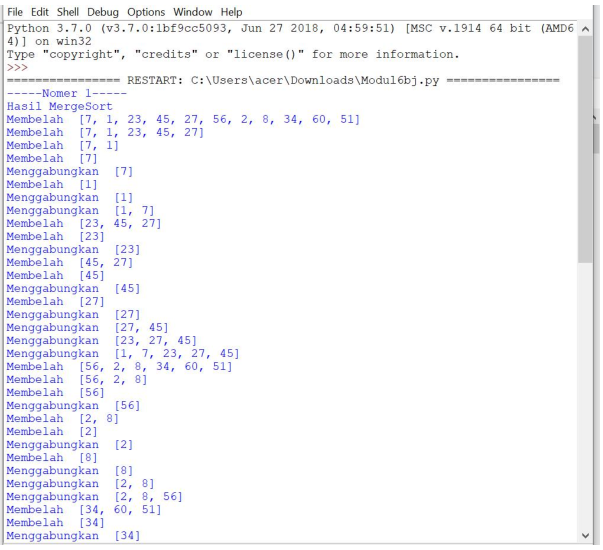
NAURA FIKAMELYALLA
L200180207/H

NO 1

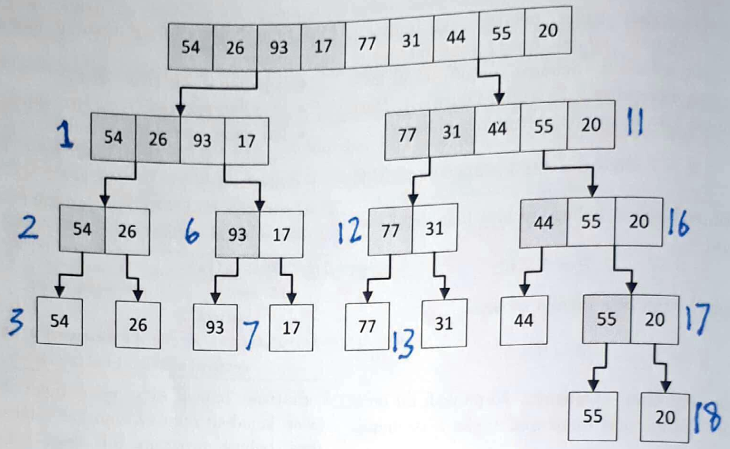


```
#NOMER 1
print ('-----Nomer 1-----')
class MhsTIF(object) :
    def __init__(self, nama, nim, asal, uangsaku) :
        self.nama = nama
        self.nim = nim
        self.asal = asal
        self.uangsaku = uangsaku

m0 = MhsTIF('Naura', 7, 'Madiun', 300000)
m1 = MhsTIF('Fafa', 1, 'Solo', 320000)
m2 = MhsTIF('Mifta', 23, 'Kartasura', 350000)
m3 = MhsTIF('Falah', 45, 'Solo', 290000)
m4 = MhsTIF('Dewi', 27, 'Karanganyar', 310000)
m5 = MhsTIF('Lia', 56, 'Wonogiri', 380000)
m6 = MhsTIF('Bagus', 2, 'Boyolali', 280000)
m7 = MhsTIF('Wahyu', 8, 'Sragen', 330000)
m8 = MhsTIF('Laila', 34, 'Purwodadi', 340000)
m9 = MhsTIF('Alfina', 60, 'Sleman', 390000)
m10 = MhsTIF('Nuha', 51, 'Surabaya', 370000)

urut =[m0.nim, m1.nim, m2.nim, m3.nim, m4.nim, m5.nim,
       m6.nim, m7.nim,m8.nim, m9.nim, m10.nim]

def mergeSort(nlist):
    print("Membelah ", nlist)
    if len(nlist)>1:
        mid = len(nlist)//2
        lefthalf = nlist[:mid]
        righthalf = nlist[mid:]

        mergeSort(lefthalf)
        mergeSort(righthalf)
        i=j=k=0
        while i < len(lefthalf) and j < len(righthalf):
            if lefthalf[i] < righthalf[j]:
                nlist[k]=lefthalf[i]
                i=i+1
            else:
                nlist[k]=righthalf[j]
```

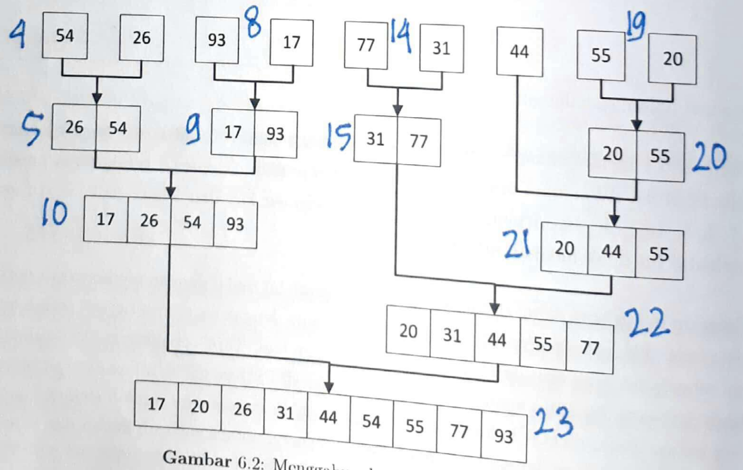


```
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:59:51) [MSC v.1914 64 bit (AMD6
4)] on win32
Type "copyright", "credits" or "license()" for more information.
>>>
================ RESTART: C:\Users\acer\Downloads\Modul6bj.py ================
-----Nomer 1-----
Hasil MergeSort
Membelah  [7, 1, 23, 45, 27, 56, 2, 8, 34, 60, 51]
Membelah  [7, 1, 23, 45, 27]
Membelah  [7, 1]
Membelah  [7]
Menggabungkan  [7]
Membelah  [1]
Menggabungkan  [1]
Menggabungkan  [1, 7]
Membelah  [23, 45, 27]
Membelah  [23]
Menggabungkan  [23]
Membelah  [45, 27]
Membelah  [45]
Menggabungkan  [45]
Membelah  [27]
Menggabungkan  [27]
Menggabungkan  [27, 45]
Menggabungkan  [23, 27, 45]
Menggabungkan  [1, 7, 23, 27, 45]
Membelah  [56, 2, 8, 34, 60, 51]
Membelah  [56, 2, 8]
Membelah  [56]
Menggabungkan  [56]
Membelah  [2, 8]
Membelah  [2]
Menggabungkan  [2]
Membelah  [8]
Menggabungkan  [8]
Menggabungkan  [2, 8]
Menggabungkan  [2, 8, 56]
Membelah  [34, 60, 51]
Membelah  [34]
Menggabungkan  [34]
```

NO 2

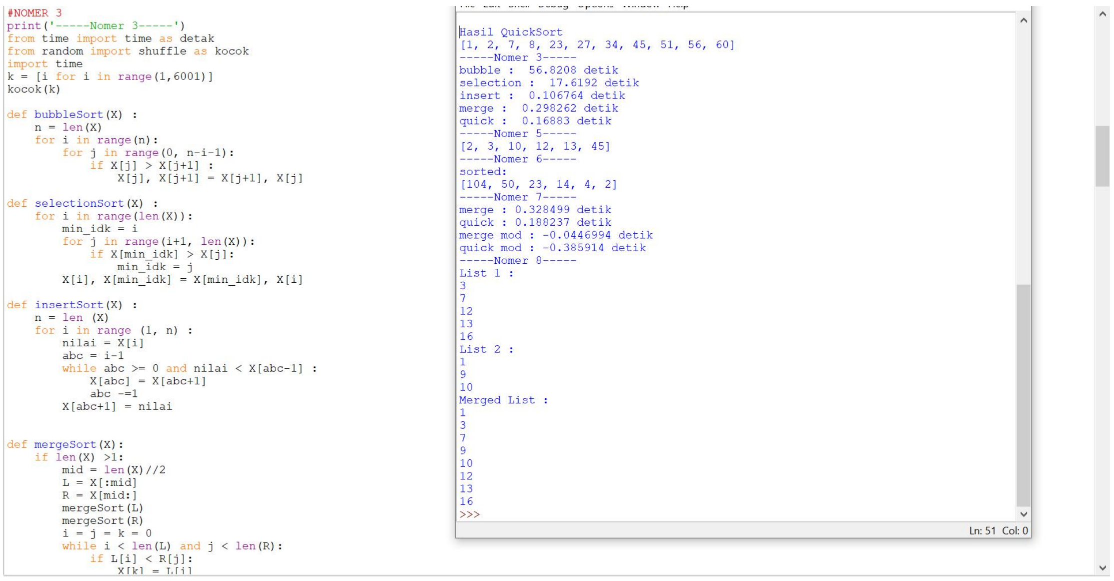


Gambar 6.1: Membelah list sampai tiap sub-list berisi satu elemen atau kosong. Sesudah itu digabung seperti ditunjukkan di Gambar 6.2.



Gambar 6.2: Menggabungkan list satu demi satu.

NO 3



```
#NOMER 3
print('-----Nomer 3-----')
from time import time as detak
from random import shuffle as kocok
import time
k = [i for i in range(1,6001)]
kocok(k)

def bubbleSort(X) :
    n = len(X)
    for i in range(n):
        for j in range(0, n-i-1):
            if X[j] > X[j+1] :
                X[j], X[j+1] = X[j+1], X[j]

def selectionSort(X) :
    for i in range(len(X)):
        min_idk = i
        for j in range(i+1, len(X)):
            if X[min_idk] > X[j]:
                min_idk = j
        X[i], X[min_idk] = X[min_idk], X[i]

def insertSort(X) :
    n = len (X)
    for i in range (1, n) :
        nilai = X[i]
        abc = i-1
        while abc >= 0 and nilai < X[abc-1] :
            X[abc] = X[abc+1]
            abc -=1
        X[abc+1] = nilai


def mergeSort(X):
    if len(X) >1:
        mid = len(X)//2
        L = X[:mid]
        R = X[mid:]
        mergeSort(L)
        mergeSort(R)
        i = j = k = 0
        while i < len(L) and j < len(R):
            if L[i] < R[j]:
                X[k] = L[i]
```

```
Hasil QuickSort
[1, 2, 7, 8, 23, 27, 34, 45, 51, 56, 60]
-----Nomer 3-----
bubble :  56.8208 detik
selection :  17.6192 detik
insert :  0.106764 detik
merge :  0.298262 detik
quick :  0.16883 detik
-----Nomer 5-----
[2, 3, 10, 12, 13, 45]
-----Nomer 6-----
sorted:
[104, 50, 23, 14, 4, 2]
-----Nomer 7-----
merge : 0.328499 detik
quick : 0.188237 detik
merge mod : -0.0446994 detik
quick mod : -0.385914 detik
-----Nomer 8-----
List 1 :
3
7
12
13
16
List 2 :
1
9
10
Merged List :
1
3
7
9
10
12
13
16
>>>
```

Ln: 51 Col: 0

NO 4

L = [80, 7, 24, 16, 43, 91, 35, 2, 19, 72]

a. Merge sort

80	7	24	16	43	91	35	2	19	72

Langkah 1

80	7

24	16

43	91

35	2

19	72

Langkah 2

7	16	24	80

2	35	43	91

19	72

Langkah 3

2	7	16	24	35	43	80	91

19	72

Langkah 4

2	7	16	19	24	35	43	72	80	91

b. Quick sort

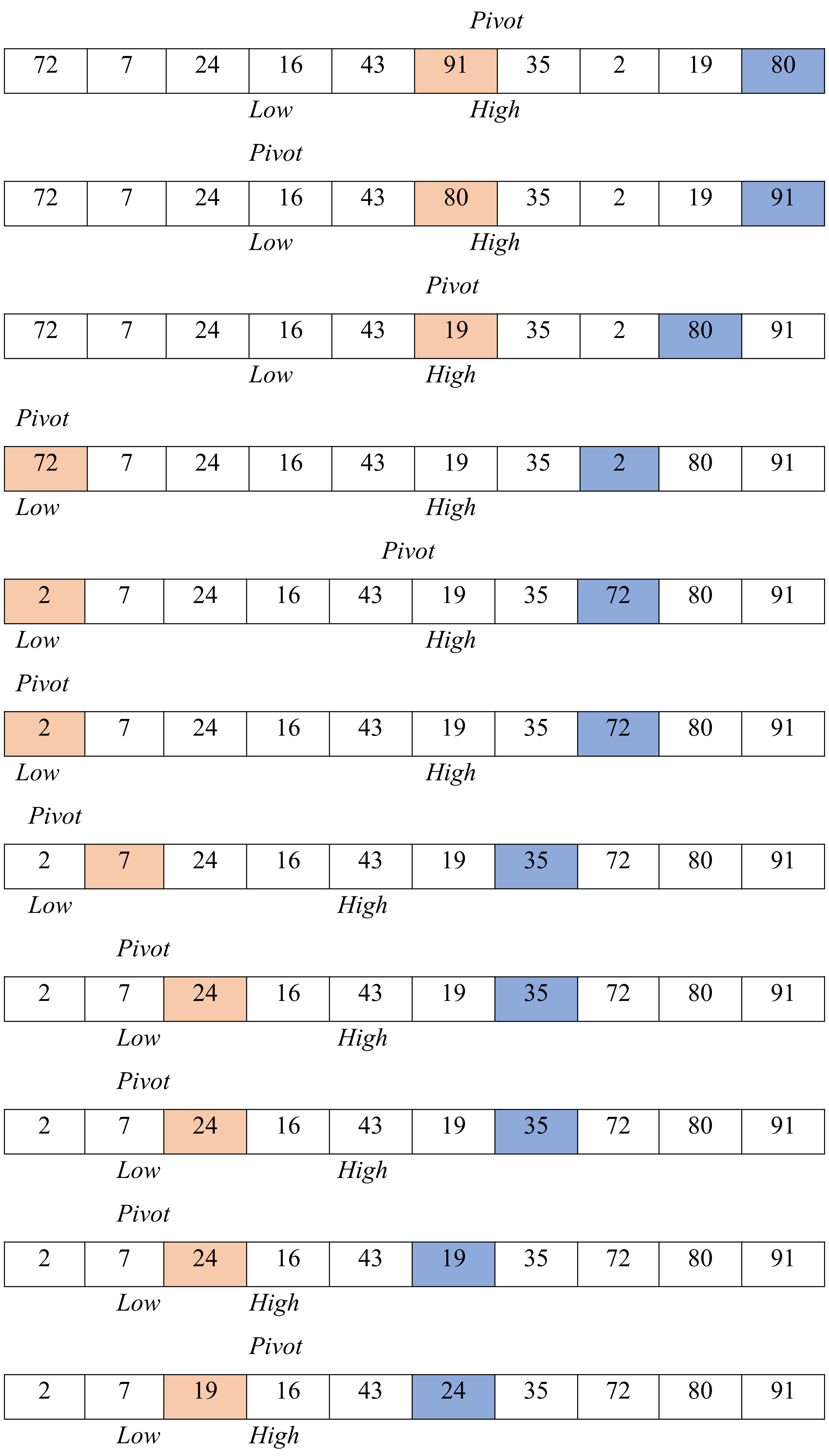
80	7	24	16	43	91	35	2	19	72

Low *High*

Pivot

72	7	24	16	43	91	35	2	19	80

Low *High*


Pivot
72 7 24 16 43 91 35 2 19 80
Low High
Pivot
72 7 24 16 43 80 35 2 19 91
Low High
Pivot
72 7 24 16 43 19 35 2 80 91
Low High
Pivot
72 7 24 16 43 19 35 2 80 91
Low High
Pivot
2 7 24 16 43 19 35 72 80 91
Low High
Pivot
2 7 24 16 43 19 35 72 80 91
Low High
Pivot
2 7 24 16 43 19 35 72 80 91
Low High
Pivot
2 7 24 16 43 19 35 72 80 91
Low High
Pivot
2 7 24 16 43 19 35 72 80 91
Low High
Pivot
2 7 24 16 43 19 35 72 80 91
Low High
Pivot
2 7 19 16 43 24 35 72 80 91
Low High

Pivot

2	7	19	16	43	24	35	72	80	91

LowHigh

Pivot

2	7	19	16	24	43	35	72	80	91

LowHigh

Pivot

2	7	19	16	24	43	35	72	80	91

LowHigh

Pivot

2	7	16	19	24	43	35	72	80	91

LowHigh

Pivot

2	7	16	19	24	43	35	72	80	91

Low *High*

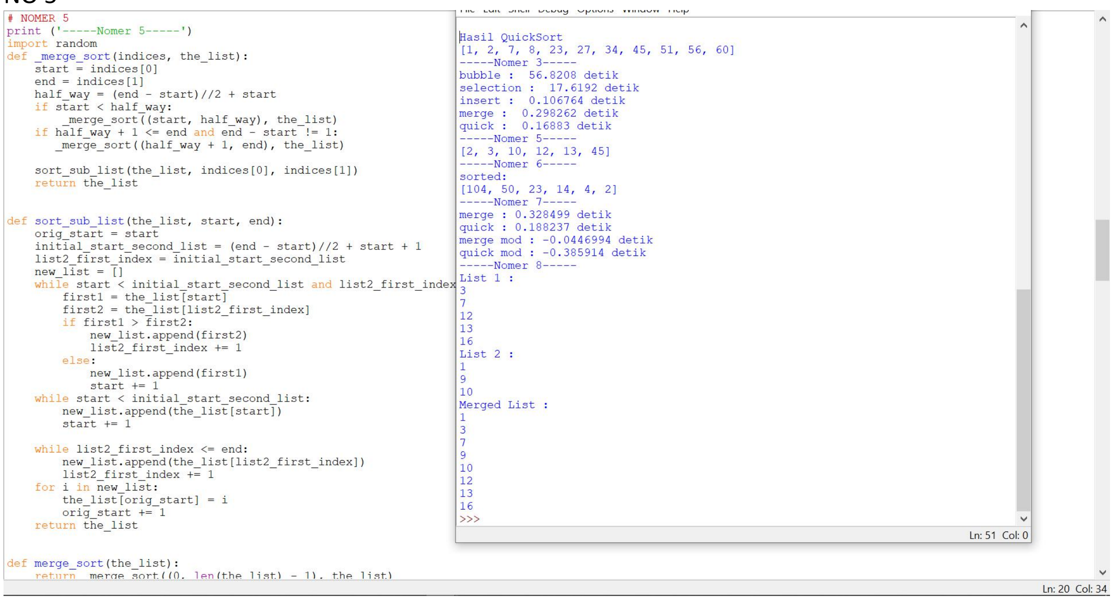
Pivot

2	7	16	19	24	35	43	72	80	91

Low *High*

2	**7**	**16**	**19**	**24**	**35**	**43**	**72**	**80**	**91**

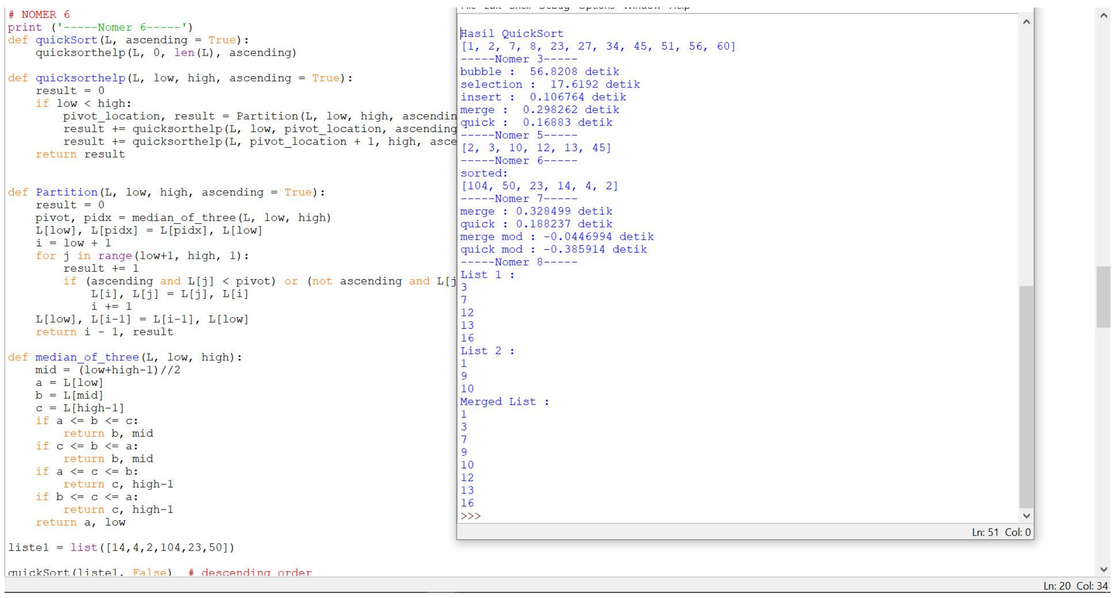
NO 5



```python
# NOMER 5
print ('-----Nomer 5-----')
import random
def _merge_sort(indices, the_list):
    start = indices[0]
    end = indices[1]
    half_way = (end - start)//2 + start
    if start < half_way:
        _merge_sort((start, half_way), the_list)
    if half_way + 1 <= end and end - start != 1:
       _merge_sort((half_way + 1, end), the_list)

    sort_sub_list(the_list, indices[0], indices[1])
    return the_list


def sort_sub_list(the_list, start, end):
    orig_start = start
    initial_start_second_list = (end - start)//2 + start + 1
    list2_first_index = initial_start_second_list
    new_list = []
    while start < initial_start_second_list and list2_first_index
        first1 = the_list[start]
        first2 = the_list[list2_first_index]
        if first1 > first2:
            new_list.append(first2)
            list2_first_index += 1
        else:
            new_list.append(first1)
            start += 1
    while start < initial_start_second_list:
        new_list.append(the_list[start])
        start += 1

    while list2_first_index <= end:
        new_list.append(the_list[list2_first_index])
        list2_first_index += 1
    for i in new_list:
        the_list[orig_start] = i
        orig_start += 1
    return the_list


def merge_sort(the_list):
    return _merge_sort((0, len(the_list) - 1), the_list)
```

```
Hasil QuickSort
[1, 2, 7, 8, 23, 27, 34, 45, 51, 56, 60]
-----Nomer 3-----
bubble :  56.8208 detik
selection :  17.6192 detik
insert :  0.106764 detik
merge :  0.298262 detik
quick :  0.16883 detik
-----Nomer 5-----
[2, 3, 10, 12, 13, 45]
-----Nomer 6-----
sorted:
[104, 50, 23, 14, 4, 2]
-----Nomer 7-----
merge : 0.328499 detik
quick : 0.188237 detik
merge mod : -0.0446994 detik
quick mod : -0.385914 detik
-----Nomer 8-----
List 1 :
3
7
12
13
16
List 2 :
1
9
10
Merged List :
1
3
7
9
10
12
13
16
>>>
```

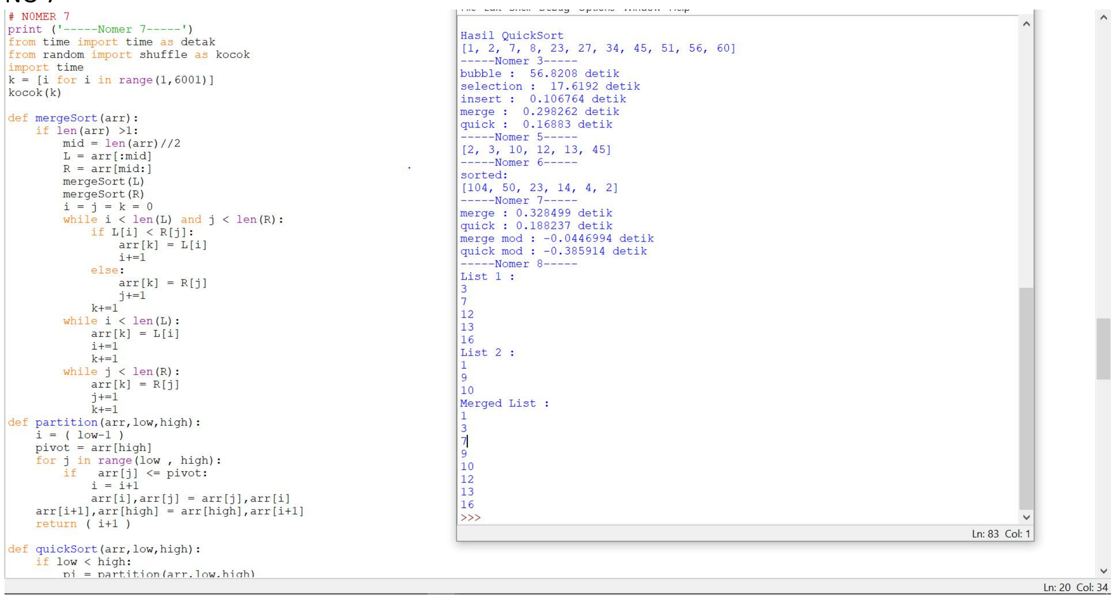
NO 6



```
# NOMER 6
print ('-----Nomer 6-----')
def quickSort(L, ascending = True):
    quicksorthelp(L, 0, len(L), ascending)

def quicksorthelp(L, low, high, ascending = True):
    result = 0
    if low < high:
        pivot_location, result = Partition(L, low, high, ascendin
        result += quicksorthelp(L, low, pivot_location, ascending
        result += quicksorthelp(L, pivot_location + 1, high, asce
    return result


def Partition(L, low, high, ascending = True):
    result = 0
    pivot, pidx = median_of_three(L, low, high)
    L[low], L[pidx] = L[pidx], L[low]
    i = low + 1
    for j in range(low+1, high, 1):
        result += 1
        if (ascending and L[j] < pivot) or (not ascending and L[j
            L[i], L[j] = L[j], L[i]
            i += 1
    L[low], L[i-1] = L[i-1], L[low]
    return i - 1, result

def median_of_three(L, low, high):
    mid = (low+high-1)//2
    a = L[low]
    b = L[mid]
    c = L[high-1]
    if a <= b <= c:
        return b, mid
    if c <= b <= a:
        return b, mid
    if a <= c <= b:
        return c, high-1
    if b <= c <= a:
        return c, high-1
    return a, low

liste1 = list([14,4,2,104,23,50])

quickSort(liste1, False)  # descending order
```

```
Hasil QuickSort
[1, 2, 7, 8, 23, 27, 34, 45, 51, 56, 60]
-----Nomer 3-----
bubble :  56.8208 detik
selection :  17.6192 detik
insert :  0.106764 detik
merge :  0.298262 detik
quick :  0.16883 detik
-----Nomer 5-----
[2, 3, 10, 12, 13, 45]
-----Nomer 6-----
sorted:
[104, 50, 23, 14, 4, 2]
-----Nomer 7-----
merge : 0.328499 detik
quick : 0.188237 detik
merge mod : -0.0446994 detik
quick mod : -0.385914 detik
-----Nomer 8-----
List 1 :
3
7
12
13
16
List 2 :
1
9
10
Merged List :
1
3
7
9
10
12
13
16
>>>
```

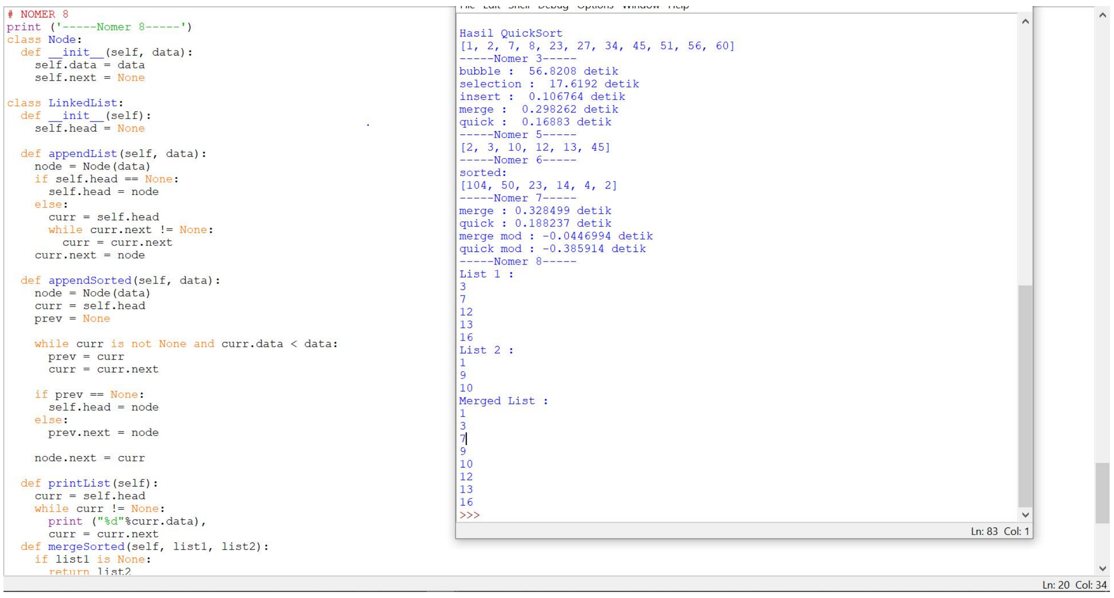
NO 7



```
# NOMER 7
print ('-----Nomer 7-----')
from time import time as detak
from random import shuffle as kocok
import time
k = [i for i in range(1,6001)]
kocok(k)

def mergeSort(arr):
    if len(arr) >1:
        mid = len(arr)//2
        L = arr[:mid]
        R = arr[mid:]
        mergeSort(L)
        mergeSort(R)
        i = j = k = 0
        while i < len(L) and j < len(R):
            if L[i] < R[j]:
                arr[k] = L[i]
                i+=1
            else:
                arr[k] = R[j]
                j+=1
            k+=1
        while i < len(L):
            arr[k] = L[i]
            i+=1
            k+=1
        while j < len(R):
            arr[k] = R[j]
            j+=1
            k+=1
def partition(arr,low,high):
    i = ( low-1 )
    pivot = arr[high]
    for j in range(low , high):
        if   arr[j] <= pivot:
            i = i+1
            arr[i],arr[j] = arr[j],arr[i]
    arr[i+1],arr[high] = arr[high],arr[i+1]
    return ( i+1 )

def quickSort(arr,low,high):
    if low < high:
        pi = partition(arr,low,high)
```

```
Hasil QuickSort
[1, 2, 7, 8, 23, 27, 34, 45, 51, 56, 60]
-----Nomer 3-----
bubble :  56.8208 detik
selection :  17.6192 detik
insert :  0.106764 detik
merge :  0.298262 detik
quick :  0.16883 detik
-----Nomer 5-----
[2, 3, 10, 12, 13, 45]
-----Nomer 6-----
sorted:
[104, 50, 23, 14, 4, 2]
-----Nomer 7-----
merge : 0.328499 detik
quick : 0.188237 detik
merge mod : -0.0446994 detik
quick mod : -0.385914 detik
-----Nomer 8-----
List 1 :
3
7
12
13
16
List 2 :
1
9
10
Merged List :
1
3
7
9
10
12
13
16
>>>
```

NO 8



```
# NOMER 8
print ('-----Nomer 8-----')
class Node:
  def __init__(self, data):
    self.data = data
    self.next = None

class LinkedList:
  def __init__(self):
    self.head = None

  def appendList(self, data):
    node = Node(data)
    if self.head == None:
      self.head = node
    else:
      curr = self.head
      while curr.next != None:
        curr = curr.next
    curr.next = node

  def appendSorted(self, data):
    node = Node(data)
    curr = self.head
    prev = None

    while curr is not None and curr.data < data:
      prev = curr
      curr = curr.next

    if prev == None:
      self.head = node
    else:
      prev.next = node

    node.next = curr

  def printList(self):
    curr = self.head
    while curr != None:
      print ("%d"%curr.data),
      curr = curr.next
  def mergeSorted(self, list1, list2):
    if list1 is None:
      return list2
```

```
Hasil QuickSort
[1, 2, 7, 8, 23, 27, 34, 45, 51, 56, 60]
-----Nomer 3-----
bubble :  56.8208 detik
selection :  17.6192 detik
insert :  0.106764 detik
merge :  0.298262 detik
quick :  0.16883 detik
-----Nomer 5-----
[2, 3, 10, 12, 13, 45]
-----Nomer 6-----
sorted:
[104, 50, 23, 14, 4, 2]
-----Nomer 7-----
merge : 0.328499 detik
quick : 0.188237 detik
merge mod : -0.0446994 detik
quick mod : -0.385914 detik
-----Nomer 8-----
List 1 :
3
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Merged List :
1
3
7
9
10
12
13
16
>>>
```