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Kelas : H

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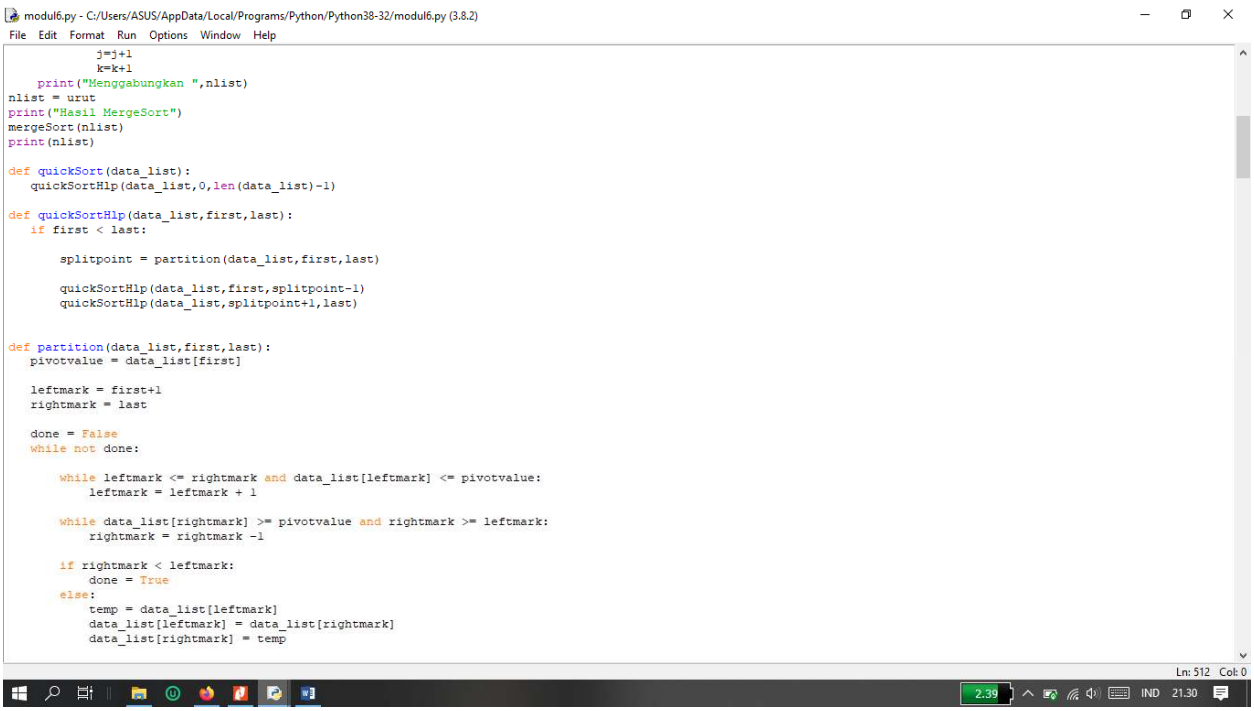
Praktikum Algoritma dan Struktur Data

Modul 6

```
#NO 1
print ('No 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('Alfianto', 9, 'Boylali', 300000)
m1 = MhsTIF('Hari', 10, 'Semarang', 320000)
m2 = MhsTIF('Mifta', 23, 'Kartasura', 350000)
m3 = MhsTIF('Desi', 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('Lusiana', 34, 'Purwodadi', 340000)
m9 = MhsTIF('Alfina', 60, 'Sleman', 390000)
m10 = MhsTIF('Akbar', 51, 'Magelang', 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]
                j=j+1
            k=k+1
```

```
                j=j+1
            k=k+1

        while i < len(lefthalf):
            nlist[k]=lefthalf[i]
            i=i+1
            k=k+1

        while j < len(righthalf):
            nlist[k]=righthalf[j]
            j=j+1
            k=k+1
    print("Menggabungkan ",nlist)
nlist = urut
print("Hasil MergeSort")
mergeSort(nlist)
print(nlist)

def quickSort(data_list):
   quickSortHlp(data_list,0,len(data_list)-1)

def quickSortHlp(data_list,first,last):
   if first < last:

       splitpoint = partition(data_list,first,last)

       quickSortHlp(data_list,first,splitpoint-1)
       quickSortHlp(data_list,splitpoint+1,last)


def partition(data_list,first,last):
   pivotvalue = data_list[first]

   leftmark = first+1
   rightmark = last

   done = False
   while not done:

       while leftmark <= rightmark and data_list[leftmark] <= pivotvalue:
           leftmark = leftmark + 1
```



modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)

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```
            j=j+1
            k=k+1
    print("Menggabungkan ",nlist)
nlist = urut
print("Hasil MergeSort")
mergeSort(nlist)
print(nlist)

def quickSort(data_list):
   quickSortHlp(data_list,0,len(data_list)-1)

def quickSortHlp(data_list,first,last):
   if first < last:

       splitpoint = partition(data_list,first,last)

       quickSortHlp(data_list,first,splitpoint-1)
       quickSortHlp(data_list,splitpoint+1,last)


def partition(data_list,first,last):
   pivotvalue = data_list[first]

   leftmark = first+1
   rightmark = last

   done = False
   while not done:

       while leftmark <= rightmark and data_list[leftmark] <= pivotvalue:
           leftmark = leftmark + 1

       while data_list[rightmark] >= pivotvalue and rightmark >= leftmark:
           rightmark = rightmark -1

       if rightmark < leftmark:
           done = True
       else:
           temp = data_list[leftmark]
           data_list[leftmark] = data_list[rightmark]
           data_list[rightmark] = temp
```

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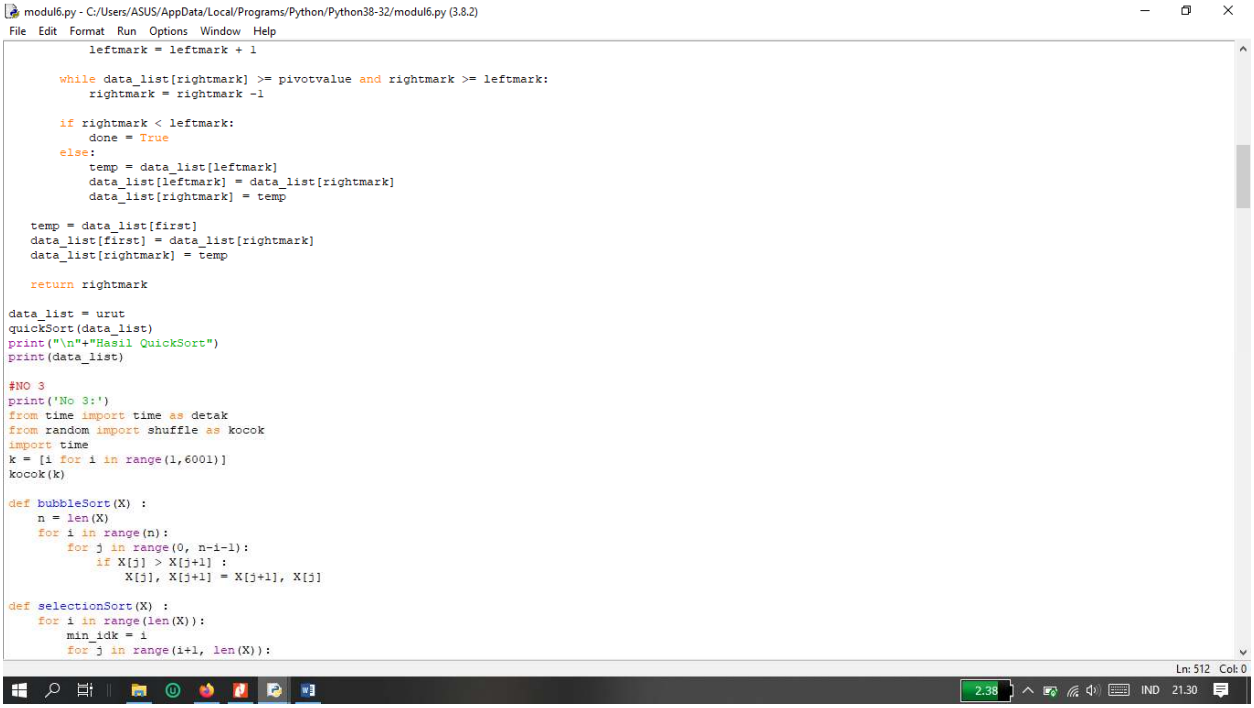
2.39 IND 21.30



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```
            leftmark = leftmark + 1

       while data_list[rightmark] >= pivotvalue and rightmark >= leftmark:
           rightmark = rightmark -1

       if rightmark < leftmark:
           done = True
       else:
           temp = data_list[leftmark]
           data_list[leftmark] = data_list[rightmark]
           data_list[rightmark] = temp

   temp = data_list[first]
   data_list[first] = data_list[rightmark]
   data_list[rightmark] = temp

   return rightmark

data_list = urut
quickSort(data_list)
print("\n"+"Hasil QuickSort")
print(data_list)

#NO 3
print('No 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_idx = i
        for j in range(i+1, len(X)):
```

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2.38 IND 21.30

modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)

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```
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]
                i+=1
            else:
                X[k] = R[j]
                j+=1
            k+=1
        while i < len(L):
            X[k] = L[i]
            i+=1
            k+=1
        while j < len(R):
            X[k] = R[j]
            j+=1
            k+=1
def partition(X,low,high):
    i = ( low-1 )
    pivot = X[high]
    for j in range(low , high):
        if   X[j] <= pivot:
            i = i+1
```

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modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)

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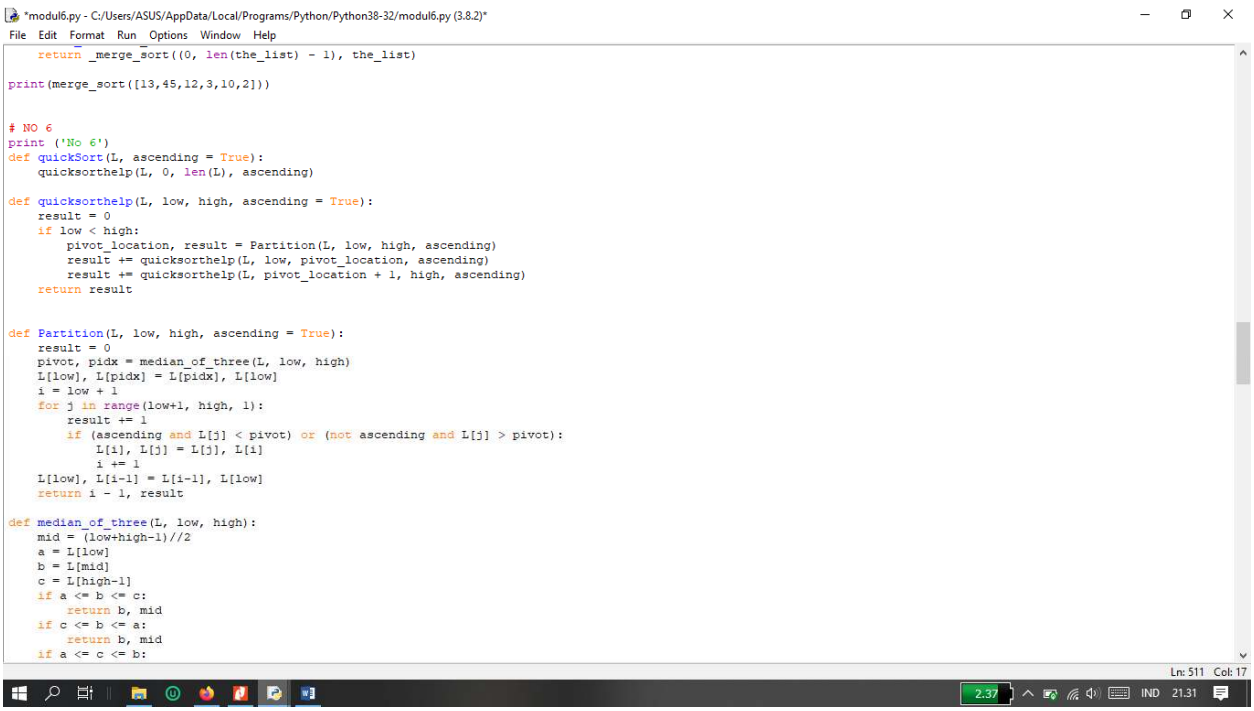
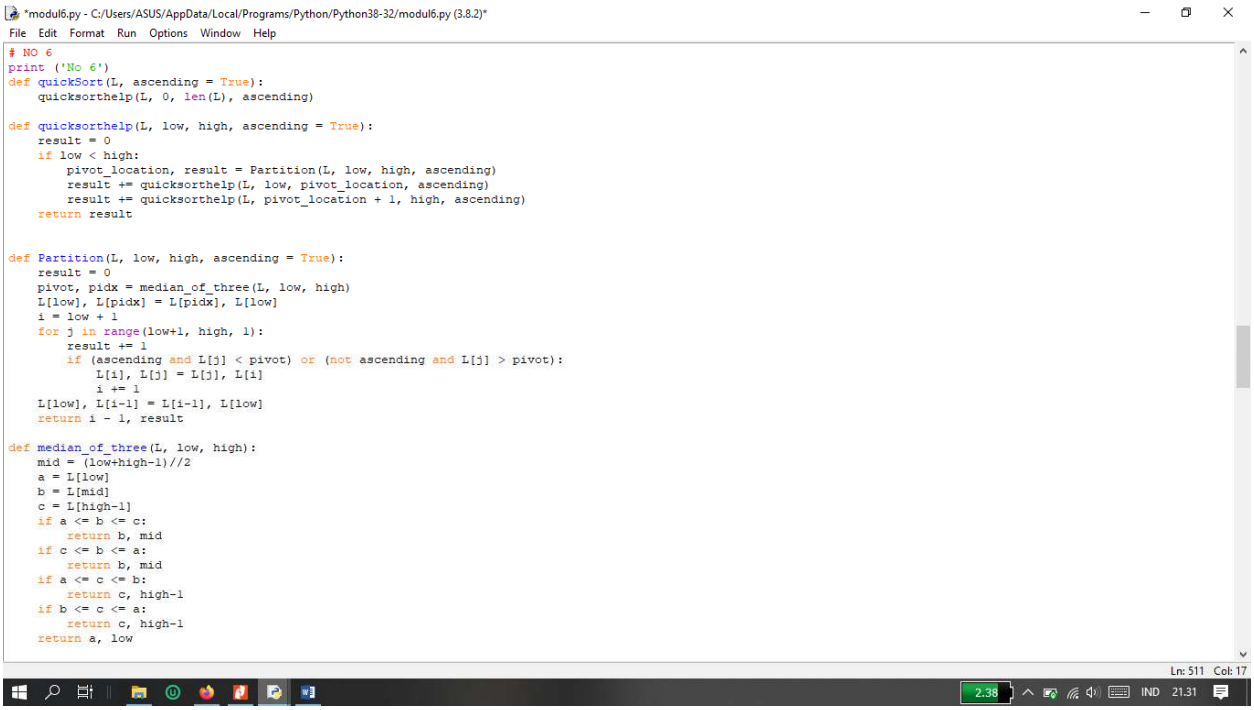
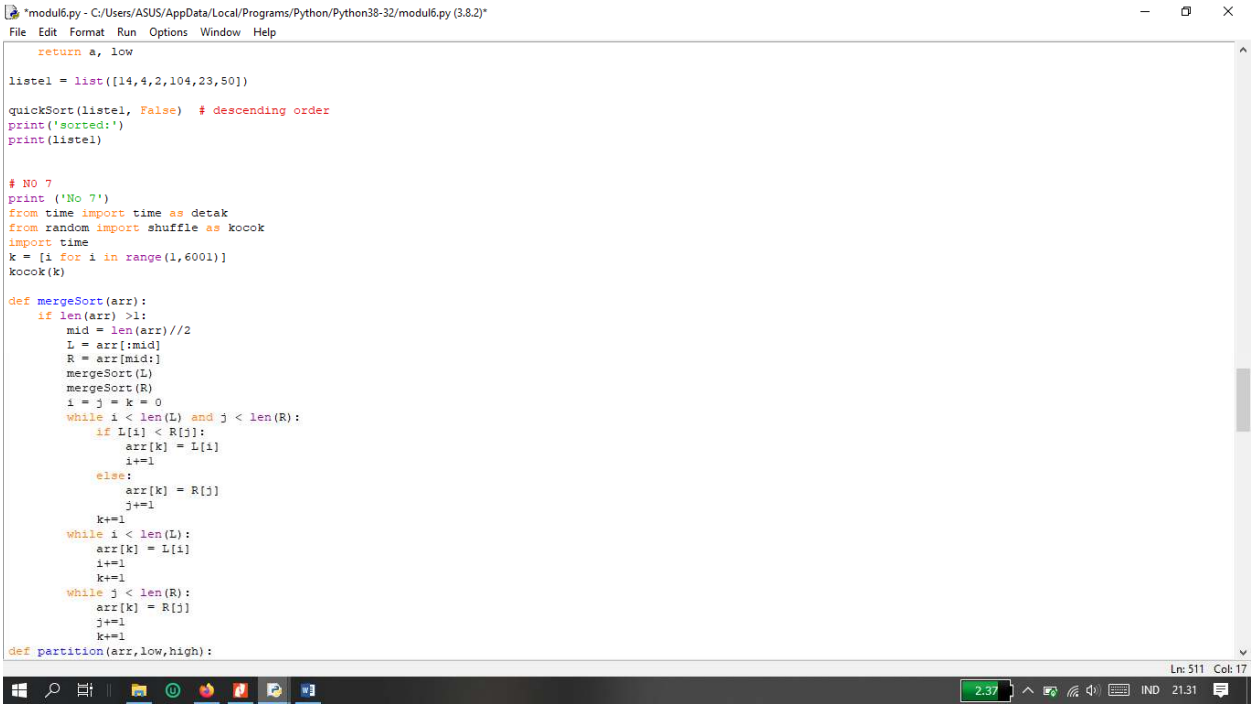
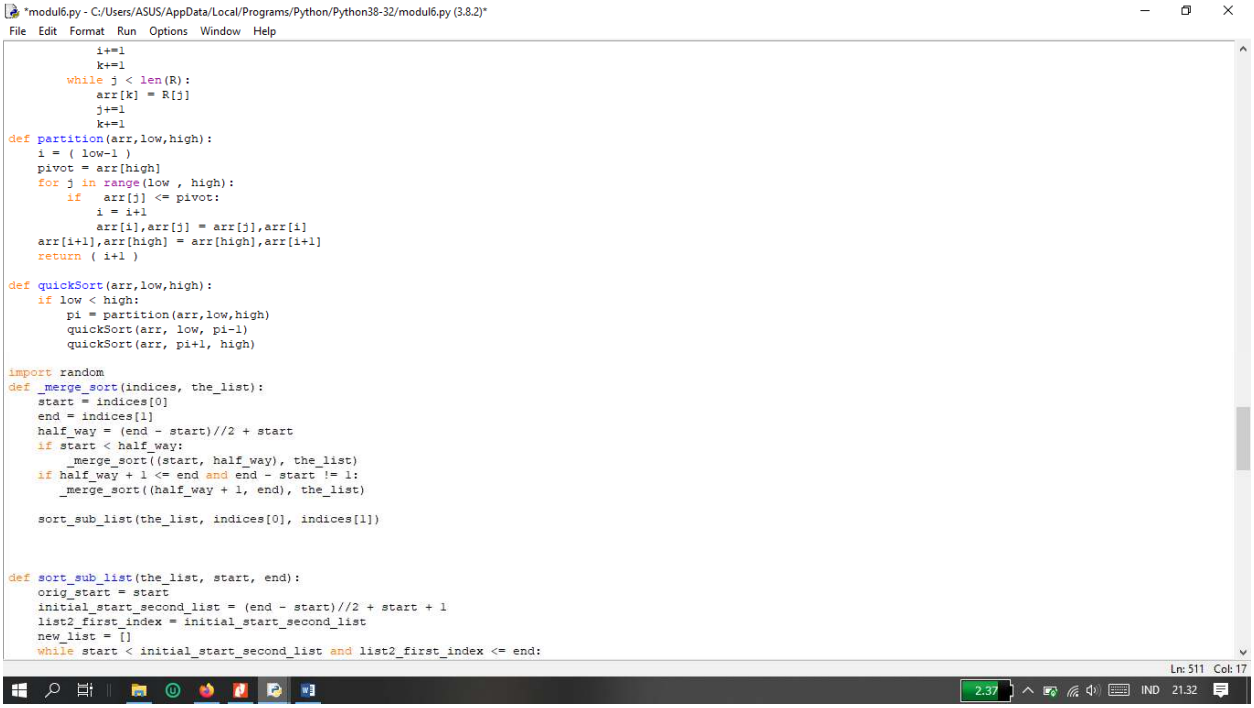
```
# NO 5
print ('No 5')
import random
def _merge_sort(indices, the_list):
    start = indices[0]
    end = indices[1]
    half_way = (end - start)//2 + start
    if start < half_way:
        _merge_sort((start, half_way), the_list)
    if half_way + 1 <= end and end - start != 1:
       _merge_sort((half_way + 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 <= end:
        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
```

Ln: 511 Col: 17


modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)
File Edit Format Run Options Window Help
return _merge_sort((0, len(the_list) - 1), the_list)
print(merge_sort([13,45,12,3,10,2]))
# NO 6
print ('No 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, ascending)
result += quicksorthelp(L, low, pivot_location, ascending)
result += quicksorthelp(L, pivot_location + 1, high, ascending)
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] > pivot):
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:
Ln: 511 Col: 17
2.37
IND 21.31


modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)
File Edit Format Run Options Window Help
NO 6
print ('No 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, ascending)
result += quicksorthelp(L, low, pivot_location, ascending)
result += quicksorthelp(L, pivot_location + 1, high, ascending)
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] > pivot):
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
Ln: 511 Col: 17
2.38
IND 21.31


modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)
File Edit Format Run Options Window Help
return a, low
listel = list([14,4,2,104,23,50])
quickSort(listel, False) # descending order
print('sorted:')
print(listel)
# NO 7
print ('No 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):
Ln: 511 Col: 17
2.37
IND 21.31


modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)
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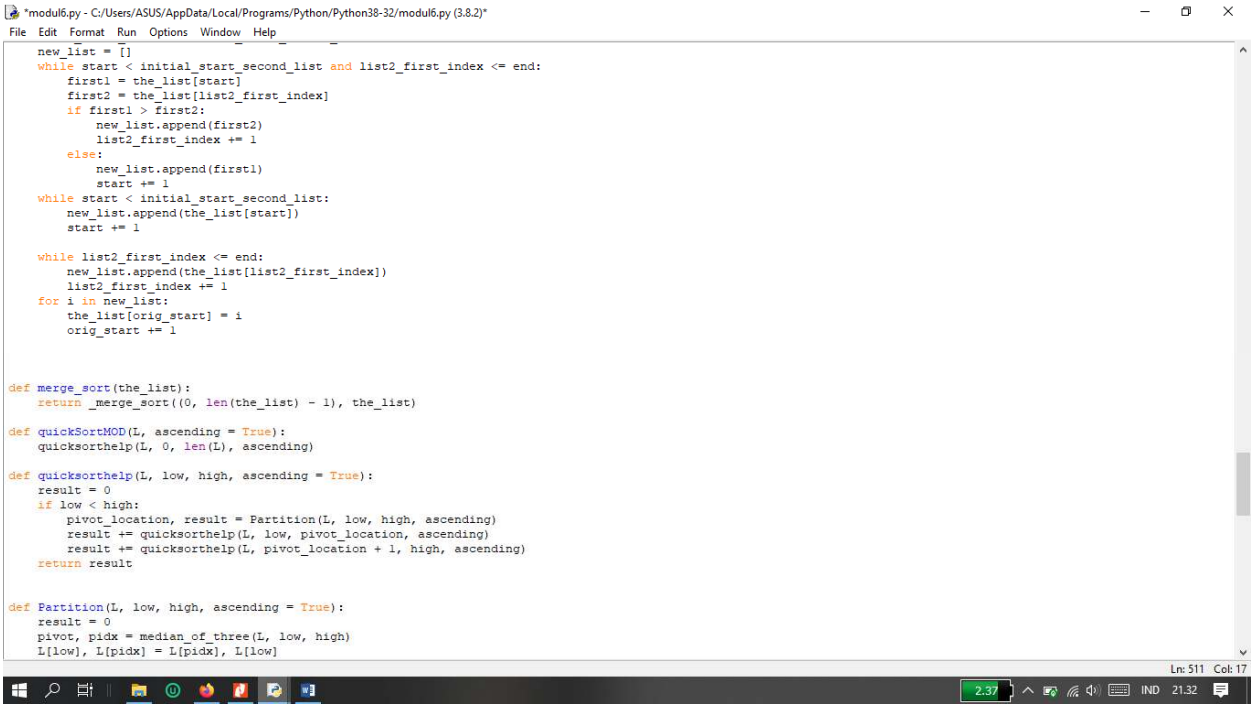
i+=1
k+=1
while j < len(R):
arr[k] = R[j]
j+=1
k+=1
def partition(arr,low,high):
i = (low-1)
pivot = arr[high]
for j in range(low , high):
if arr[j] <= pivot:
i = i+1
arr[i],arr[j] = arr[j],arr[i]
arr[i+1],arr[high] = arr[high],arr[i+1]
return (i+1)
def quickSort(arr,low,high):
if low < high:
pi = partition(arr,low,high)
quickSort(arr, low, pi-1)
quickSort(arr, pi+1, high)
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])
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_llst = []
while start < initial_start_second_list and list2_first_index <= end:
Ln: 511 Col: 17
2.37
IND 21.32


modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)
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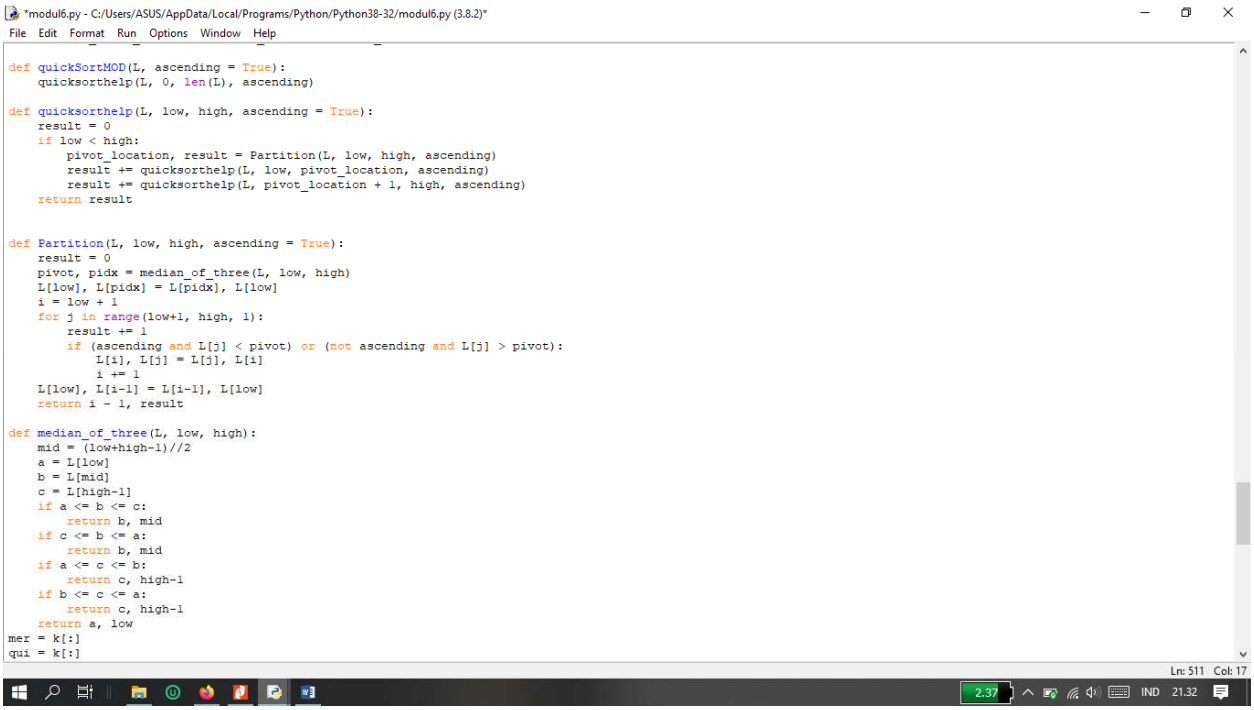
new_list = []
while start < initial_start_second_list and list2_first_index <= end:
first1 = the_list[start]
first2 = the_list[list2_first_index]
if first1 > first2:
new_list.append(first2)
list2_first_index += 1
else:
new_list.append(first1)
start += 1
while start < initial_start_second_list:
new_list.append(the_list[start])
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
def merge_sort(the_list):
return _merge_sort((0, len(the_list) - 1), the_list)
def quickSortMOD(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, ascending)
result += quicksorthelp(L, low, pivot_location, ascending)
result += quicksorthelp(L, pivot_location + 1, high, ascending)
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]
Ln: 511 Col: 17
2.37
IND 21.32


modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)
File Edit Format Run Options Window Help
def quickSortMOD(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, ascending)
result += quicksorthelp(L, low, pivot_location, ascending)
result += quicksorthelp(L, pivot_location + 1, high, ascending)
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] > pivot):
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
mer = k[:]
qui = k[:]
Ln: 511 Col: 17
2.37
IND 21.32

modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)

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```
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
mer = k[:]
qui = k[:]
mer2 = k[:]
qui2 = k[:]


aw=detak();mergeSort(mer);ak=detak();print('merge : %g detik' %(ak-aw));
aw=detak();quickSort(qui,0,len(qui)-1);ak=detak();print('quick : %g detik' %(ak-aw));
aw=detak();merge_sort(mer2);print('merge mod : %g detik' %(ak-aw));
aw=detak();quickSortMOD(qui2, False);print('quick mod : %g detik' %(ak-aw));


# NO 8
print ('Nom 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
```

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modul6.py - C:/Users/ASUS/AppData/Local/Programs/Python/Python38-32/modul6.py (3.8.2)

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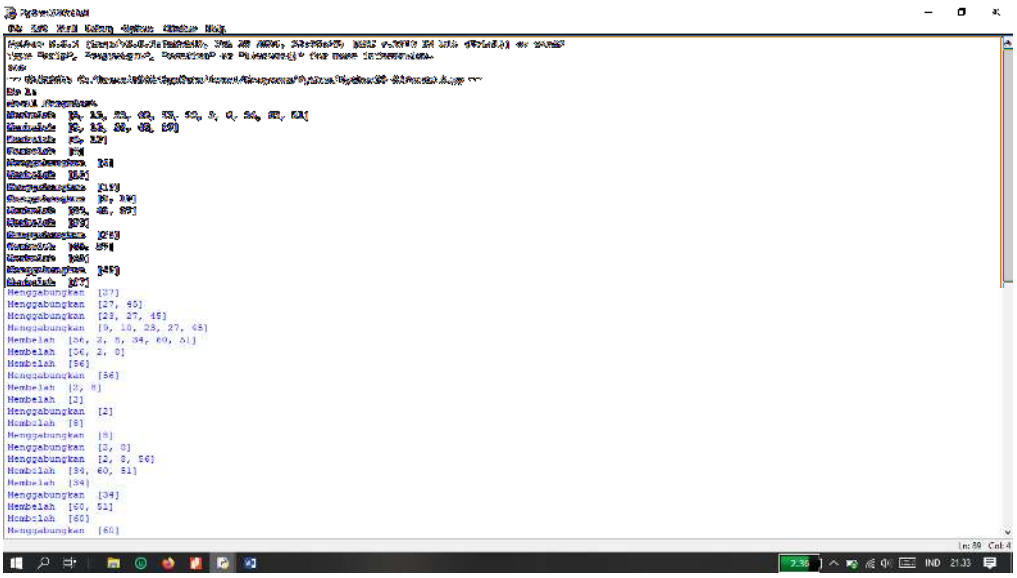
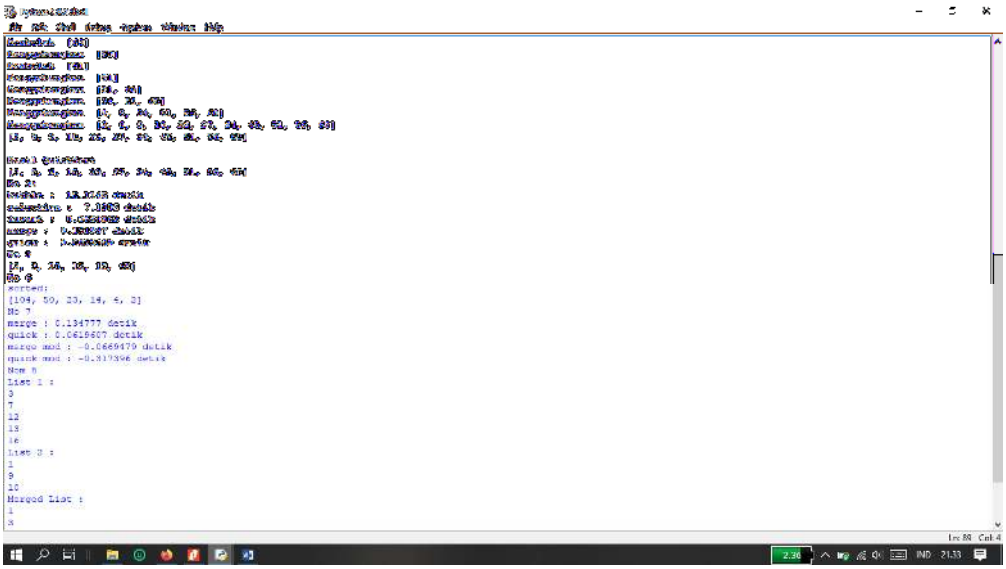
```
    curr = self.head
    while curr != None:
      print ("%d"%curr.data),
      curr = curr.next
  def mergeSorted(self, list1, list2):
    if list1 is None:
      return list2
    if list2 is None:
      return list1

    if list1.data < list2.data:
      temp = list1
      temp.next = self.mergeSorted(list1.next, list2)
    else:
      temp = list2
      temp.next = self.mergeSorted(list1, list2.next)
    return temp


list1 = LinkedList()
list1.appendSorted(13)
list1.appendSorted(12)
list1.appendSorted(3)
list1.appendSorted(16)
list1.appendSorted(7)

print("List 1 :"),
list1.printList()

list2 = LinkedList()
list2.appendSorted(9)
list2.appendSorted(10)
list2.appendSorted(1)

print("List 2 :"),
list2.printList()

list3 = LinkedList()
list3.head = list3.mergeSorted(list1.head, list2.head)

print("Merged List :"),
list3.printList()
```

Ln: 511 Col: 17





```
List 2 :
1
9
10
Merged List :
1
3
7
9
10
12
13
16
>>>
```