Nama : Nur Fadlilah Azzis
NIM : L200180113 / D

No. 1

modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)

File Edit Format Run Options Window Help

```
#Nomor 1
class Mahasiswa(object):
    def __init__(self, nama, NIM, kota, us):
        self.nama = nama
        self.NIM = NIM
        self.kotaTinggal = kota
        self.uangSaku = us

a0 = Mahasiswa('Ika', 10, 'Sukoharjo', 240000)
a1 = Mahasiswa('Budi', 51, 'Sragen', 230000)
a2 = Mahasiswa('Ahmad', 2, 'Surakarta', 250000)
a3 = Mahasiswa('Chandra', 18, 'Surakarta', 235000)
a4 = Mahasiswa('Eka', 4, 'Boyolali', 240000)
a5 = Mahasiswa('Fandi', 31, 'Salatiga', 250000)
a6 = Mahasiswa('Deni', 13, 'Klaten', 245000)
a7 = Mahasiswa('Galuh', 5, 'Wonogiri', 245000)
a8 = Mahasiswa('Janto', 23, 'Klaten', 245000)
a9 = Mahasiswa('Hasan', 64, 'Karanganyar', 270000)
a10 = Mahasiswa('Khalid', 29, 'Purwodadi', 230000)

Daftar = [a0, a1, a2, a3, a4, a5, a6, a7, a8, a9, a10]

def urutkanNIM(a):
    baru = {}
    for i in range(len(a)):
        baru[a[i].nama] = a[i].NIM
    listofTuples = sorted(baru.items(), key = lambda x: x[1])
    for elem in listofTuples:
        print (elem[0], ':', elem[1])

urutkanNIM(Daftar)
```

Python 3.8.2 Shell

File Edit Shell Debug Options Window Help

```
Python 3.8.2 (tags/v3.8.2:7b3ab59, Feb
tel)] on win32
Type "help", "copyright", "credits" or
>>>
========== RESTART: E:/prak
Ahmad : 2
Eka : 4
Galuh : 5
Ika : 10
Deni : 13
Chandra : 18
Janto : 23
Khalid : 29
Fandi : 31
Budi : 51
Hasan : 64
>>>
>>>
```

No. 2

```
#Nomor 2
def bubblesort(arr):
    n = len(arr)
    for i in range(n):
        for j in range(0, n-i-1):
            if arr[j] > arr[j+1]:
                arr[j], arr[j+1] = arr[j+1], arr[j]
    return arr

def gabung(a,b):
    c = []
    c = a+b
    n = len(c)
    for i in range(n):
        for j in range(0, n-i-1):
            if c[j] > c[j+1]:
                c[j], c[j+1] = c[j+1], c[j]
    return c

a = [5,45,12,32,6,10,2]
b = [26,8,20,14,40]
a,b = bubblesort(a),bubblesort(b)

print(a)
print(b)
print(gabung(a,b))
```

```
Python 3.8.2 (tags/v3.8.2:7b3ab59, Feb 25 2020,
tel)] on win32
Type "help", "copyright", "credits" or "license(
>>>
========== RESTART: E:\prak ALgostruk
[2, 5, 6, 10, 12, 32, 45]
[8, 14, 20, 26, 40]
[2, 5, 6, 8, 10, 12, 14, 20, 26, 32, 40, 45]
>>>
```

No. 3 & 4

modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)

File Edit Format Run Options Window Help

```
#Nomor 3 dan 4
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 bubb(arr):
    n = len(arr)
    for i in range(n):
        for j in range(0, n-i-1):
            if arr[j] > arr[j+1] :
                arr[j], arr[j+1] = arr[j+1], arr[j]

def sele(A):
    for i in range(len(A)):
        min_idx = i
        for j in range(i+1, len(A)):
            if A[min_idx] > A[j]:
                min_idx = j
        A[i], A[min_idx] = A[min_idx], A[i]

def inse(arr):
    for i in range(1, len(arr)):
        key = arr[i]
        j = i-1
        while j >=0 and key < arr[j] :
                arr[j+1] = arr[j]
                j -= 1
        arr[j+1] = key

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):
```

Python 3.8.2 Shell

File Edit Shell Debug Options

```
Python 3.8.2 (tags/v3.8.2:
tel)] on win32
Type "help", "copyright",
>>>
========== RESTA
bubble : 8.04689 detik
selection : 3.61422 detik
insertion : 3.76191 detik
merge : 0.0740147 detik
quick : 0.0339525 detik
>>>
```

Type here to search

modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)

File Edit Format Run Options Window Help

```
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)
        quickSort(arr, low, pi-1)
        quickSort(arr, pi+1, high)
```

Python 3.8.2 Shell

File Edit Shell Debug Options Wi

```
Python 3.8.2 (tags/v3.8.2:7b
tel)] on win32
Type "help", "copyright", "c
>>>
========== RESTAR
bubble : 8.04689 detik
selection : 3.61422 detik
insertion : 3.76191 detik
merge : 0.0740147 detik
quick : 0.0339525 detik
>>>
```

Type here to search

modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)

File Edit Format Run Options Window Help

```
bub = k[:]
sel = k[:]
ins = k[:]
mer = k[:]
qui = k[:]

aw=detak();bubb(bub);ak=detak();print('bubble : %g detik' %(ak-aw));
aw=detak();sele(sel);ak=detak();print('selection : %g detik' %(ak-aw));
aw=detak();inse(ins);ak=detak();print('insertion : %g detik' %(ak-aw));
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));
```

Python 3.8.2 Shell

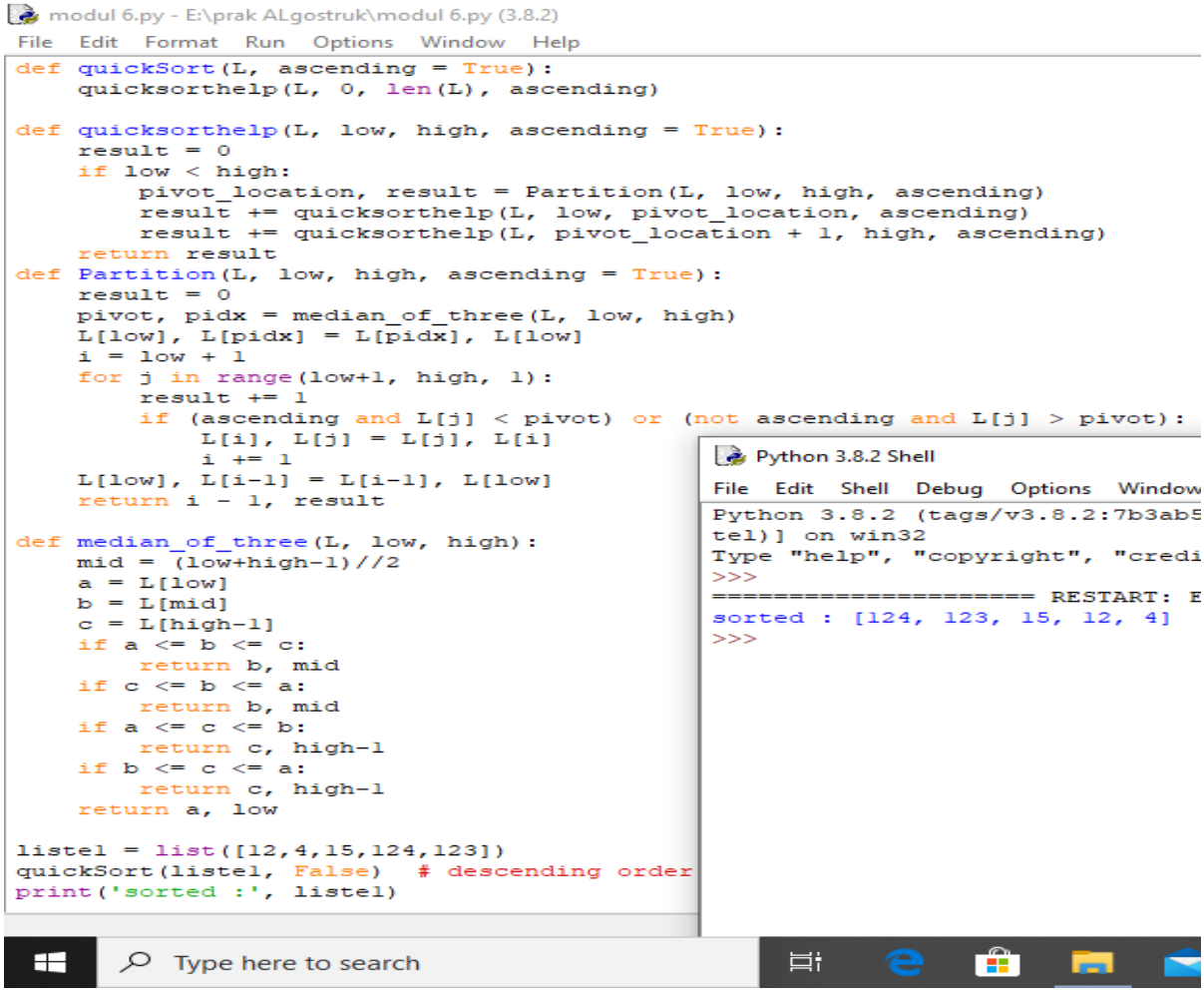
File Edit Shell Debug Options Wir

```
Python 3.8.2 (tags/v3.8.2:7b3
tel)] on win32
Type "help", "copyright", "cr
>>>
========== RESTART
bubble : 8.04689 detik
selection : 3.61422 detik
insertion : 3.76191 detik
merge : 0.0740147 detik
quick : 0.0339525 detik
>>>
```

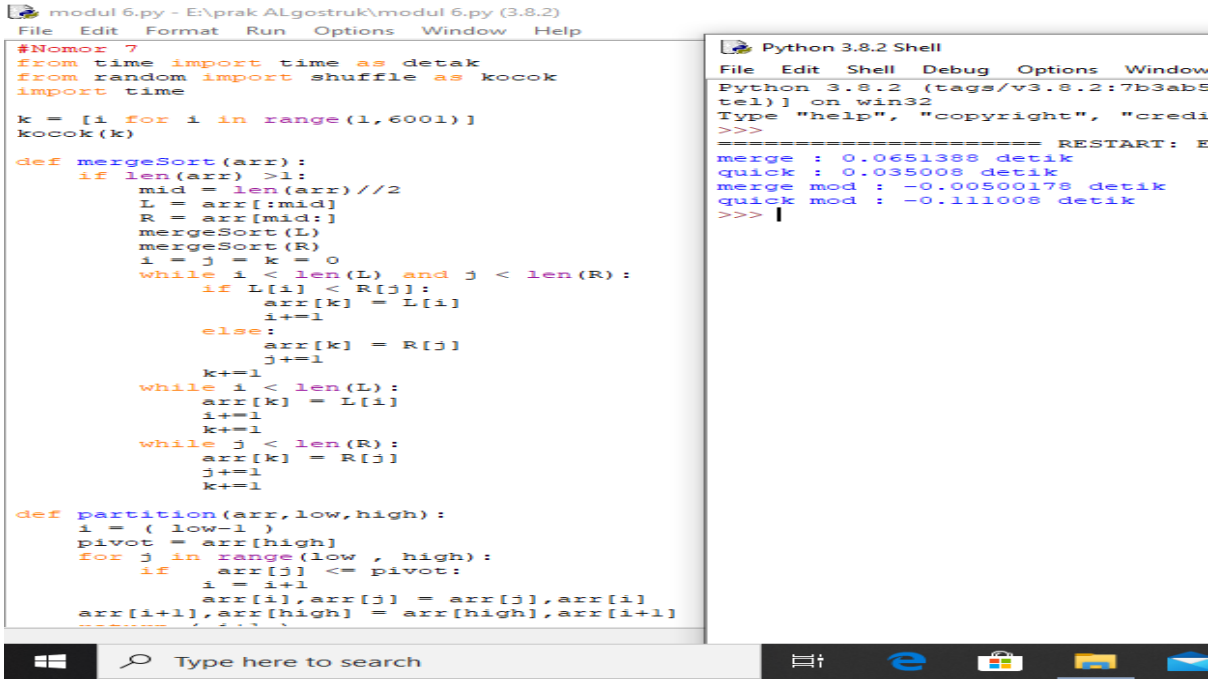
No. 5

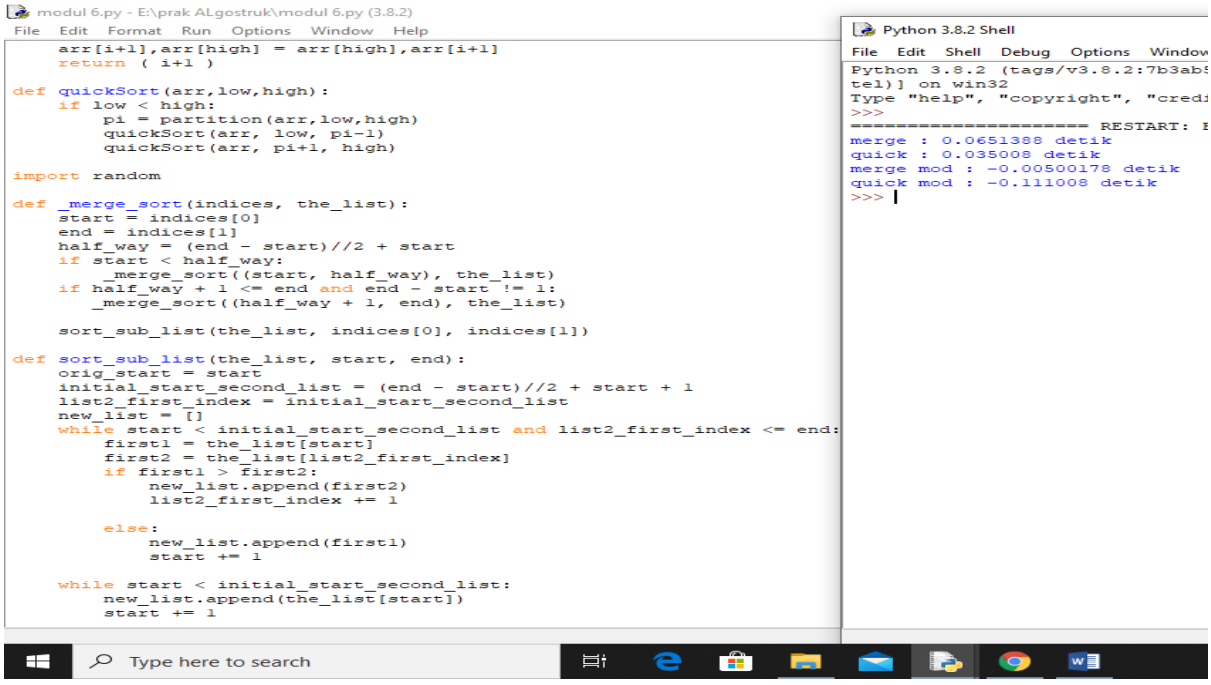

modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)
File Edit Format Run Options Window Help
import random
def _merge_sort(indices, the_list):
start = indices[0]
end = indices[1]
half_way = (end - start)//2 + start
if start < half_way:
_merge_sort((start, half_way), the_list)
if half_way + 1 <= end and 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
def merge_sort(the_list):
return _merge_sort((0, len(the_list) - 1), the_list)
print(merge_sort([13,45,12]))
Python 3.8.2 Shell
File Edit Shell Deb
Python 3.8.2 (ta
tel)] on win32
Type "help", "cc
>>>
[12, 13, 45]
>>>
Type here to search

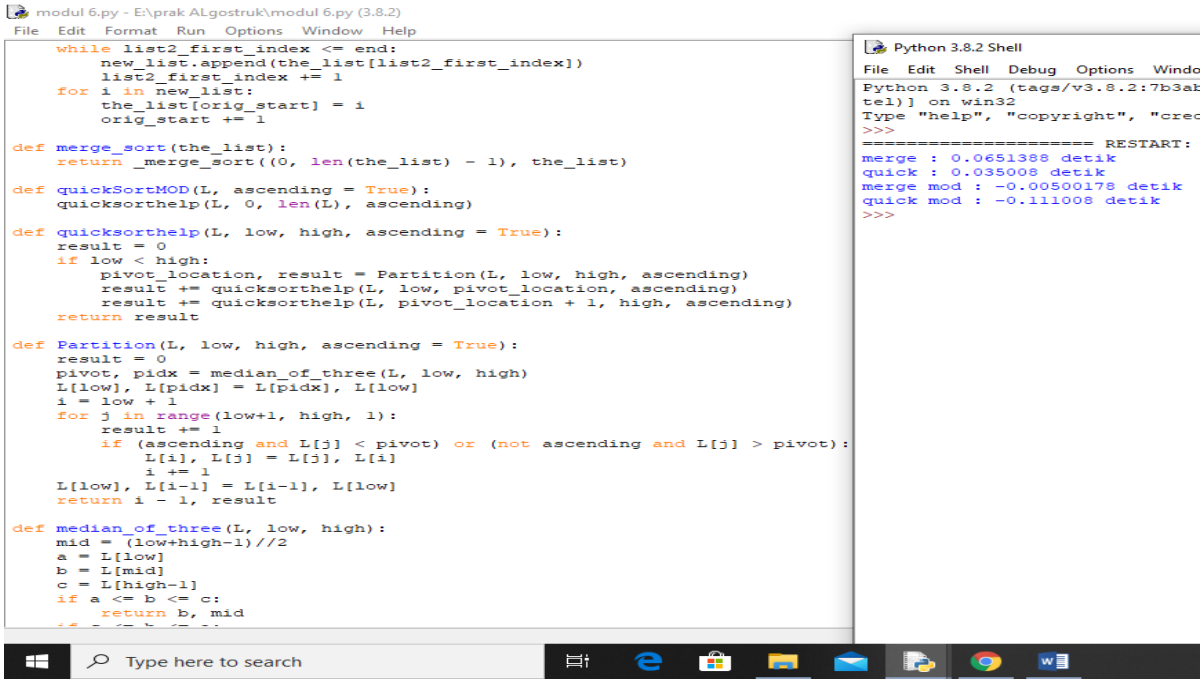
No. 6

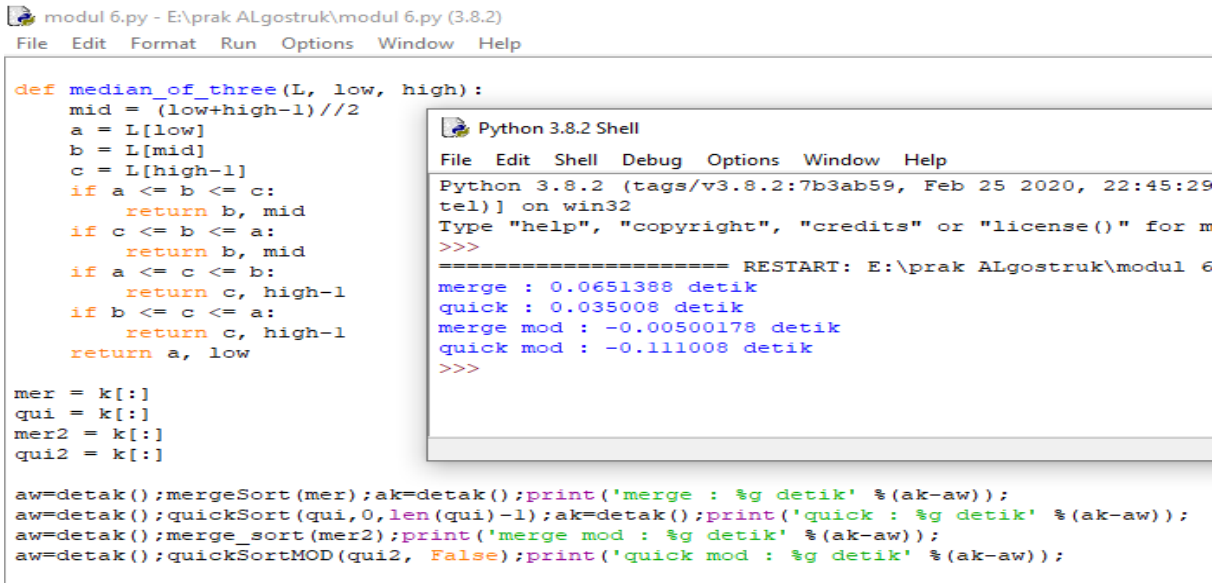

modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)
File Edit Format Run Options Window Help
def quickSort(L, ascending = True):
quicksorthelp(L, 0, len(L), ascending)
def quicksorthelp(L, low, high, ascending = True):
result = 0
if low < high:
pivot_location, result = Partition(L, low, high, ascending)
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
listel = list([12,4,15,124,123])
quickSort(listel, False) # descending order
print('sorted :', listel)
Python 3.8.2 Shell
File Edit Shell Debug Options Window
Python 3.8.2 (tags/v3.8.2:7b3ab5
tel)] on win32
Type "help", "copyright", "credi
>>>
========== RESTART: E
sorted : [124, 123, 15, 12, 4]
>>>
Type here to search

No. 7


modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)
File Edit Format Run Options Window Help
#Nomor 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]
Python 3.8.2 Shell
File Edit Shell Debug Options Window
Python 3.8.2 (tags/v3.8.2:7b3ab5
tel)] on win32
Type "help", "copyright", "credi
>>>
========== RESTART: E
merge : 0.0651388 detik
quick : 0.035008 detik
merge mod : -0.00500178 detik
quick mod : -0.111008 detik
>>>
Type here to search


modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)
File Edit Format Run Options Window Help
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_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
Python 3.8.2 Shell
File Edit Shell Debug Options Window
Python 3.8.2 (tags/v3.8.2:7b3ab5
tel)] on win32
Type "help", "copyright", "credi
>>>
========== RESTART:
merge : 0.0651388 detik
quick : 0.035008 detik
merge mod : -0.00500178 detik
quick mod : -0.111008 detik
>>>
Type here to search


modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)
File Edit Format Run Options Window Help
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]
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
Python 3.8.2 Shell
File Edit Shell Debug Options Windo
Python 3.8.2 (tags/v3.8.2:7b3ab
tel)] on win32
Type "help", "copyright", "crec
>>>
========== RESTART:
merge : 0.0651388 detik
quick : 0.035008 detik
merge mod : -0.00500178 detik
quick mod : -0.111008 detik
>>>
Type here to search


modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)
File Edit Format Run Options Window Help
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));
Python 3.8.2 Shell
File Edit Shell Debug Options Window Help
Python 3.8.2 (tags/v3.8.2:7b3ab59, Feb 25 2020, 22:45:29
tel)] on win32
Type "help", "copyright", "credits" or "license()" for m
>>>
========== RESTART: E:\prak ALgostruk\modul 6
merge : 0.0651388 detik
quick : 0.035008 detik
merge mod : -0.00500178 detik
quick mod : -0.111008 detik
>>>

modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)

File Edit Format Run Options Window Help

```
#Nomor 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
```

Python 3.8.2 Shell

File Edit Shell Debug Options Window

```
Python 3.8.2 (tags/v3.8.2:7b3ab59
tel)] on win32
Type "help", "copyright", "credit
>>>
========== RESTART: E:
List 1 :
3
7
12
13
16
List 2 :
1
9
10
Merged List :
1
3
7
9
10
12
13
16
>>>
```

Type here to search

modul 6.py - E:\prak ALgostruk\modul 6.py (3.8.2)

File Edit Format Run Options Window Help

```
    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()
```

Python 3.8.2 Shell

File Edit Shell Debug Options Win

```
Python 3.8.2 (tags/v3.8.2:7b3
tel)] on win32
Type "help", "copyright", "cr
>>>
========== RESTART
List 1 :
3
7
12
13
16
List 2 :
1
9
10
Merged List :
1
3
7
9
10
12
13
16
>>>
```

Type here to search