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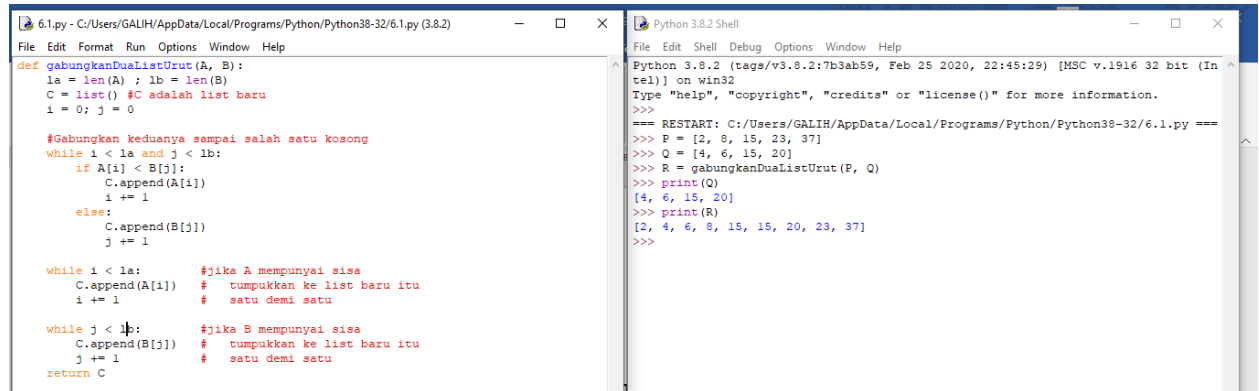
NIM : L200180006

Kelas : A

Laporan Praktikum dan Tugas Modul 6

• Praktikum

6.1 Menggabungkan dua list yang sudahurut



The screenshot shows a Python IDE with two windows. The left window, titled '6.1.py', contains a function `gabungkanDuaListUrut(A, B)` that merges two sorted lists A and B into a new list C. The function uses two while loops to compare elements from A and B and append them to C in sorted order. The right window, titled 'Python 3.8.2 Shell', shows the execution of the function with `P = [2, 8, 15, 23, 37]` and `Q = [4, 6, 15, 20]`. The output shows the merged list `R = [2, 4, 6, 8, 15, 15, 20, 23, 37]`.

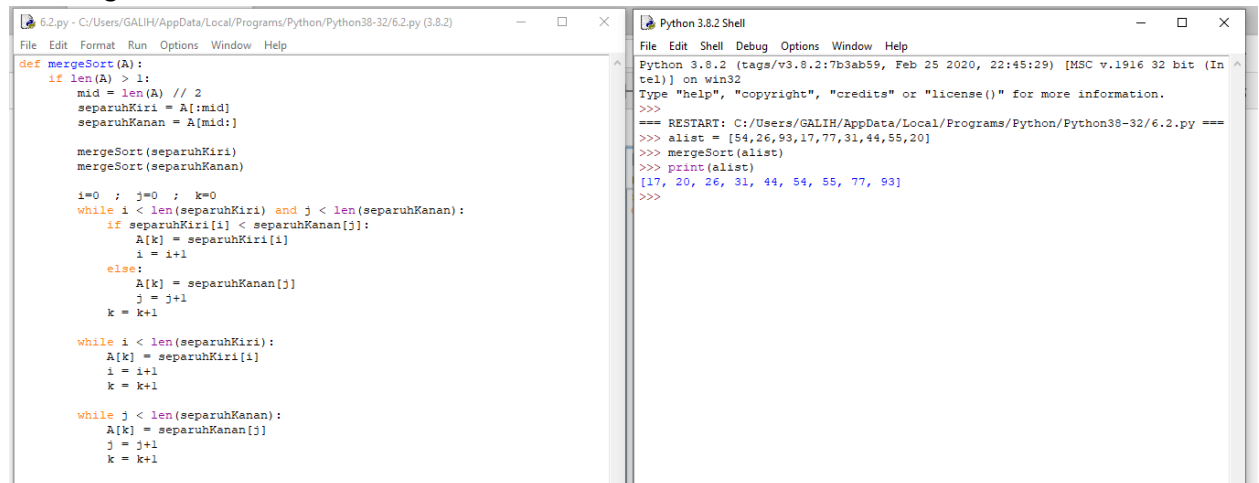
```
def gabungkanDuaListUrut(A, B):
    la = len(A) ; lb = len(B)
    C = list() #C adalah list baru
    i = 0; j = 0

    #Gabungkan keduanya sampai salah satu kosong
    while i < la and j < lb:
        if A[i] < B[j]:
            C.append(A[i])
            i += 1
        else:
            C.append(B[j])
            j += 1

    while i < la:
        C.append(A[i])
        i += 1
    while j < lb:
        C.append(B[j])
        j += 1
    return C

P = [2, 8, 15, 23, 37]
Q = [4, 6, 15, 20]
R = gabungkanDuaListUrut(P, Q)
print(R)
```

6.2 Merge sort



The screenshot shows a Python IDE with two windows. The left window, titled '6.2.py', contains a recursive function `mergeSort(A)` that sorts a list A using the merge sort algorithm. The function splits the list into two halves, sorts each half recursively, and then merges them back together. The right window, titled 'Python 3.8.2 Shell', shows the execution of the function with `alist = [54, 26, 93, 17, 77, 31, 44, 55, 20]`. The output shows the sorted list `[17, 20, 26, 31, 44, 54, 55, 77, 93]`.

```
def mergeSort(A):
    if len(A) > 1:
        mid = len(A) // 2
        separuhKiri = A[:mid]
        separuhKanan = A[mid:]

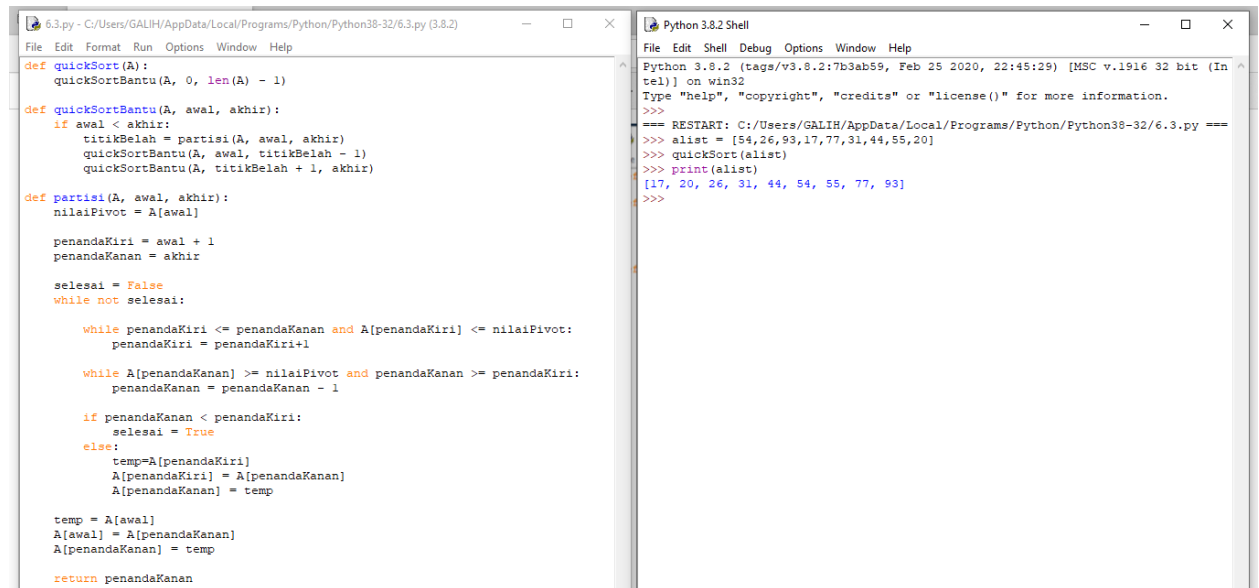
        mergeSort(separuhKiri)
        mergeSort(separuhKanan)

        i=0 ; j=0 ; k=0
        while i < len(separuhKiri) and j < len(separuhKanan):
            if separuhKiri[i] < separuhKanan[j]:
                A[k] = separuhKiri[i]
                i = i+1
            else:
                A[k] = separuhKanan[j]
                j = j+1
            k = k+1

        while i < len(separuhKiri):
            A[k] = separuhKiri[i]
            i = i+1
            k = k+1

        while j < len(separuhKanan):
            A[k] = separuhKanan[j]
            j = j+1
            k = k+1
```

6.3 Quick sort



The screenshot shows a Python IDE with two windows. The left window displays a Python script for a Quick Sort algorithm. The right window shows the Python 3.8.2 Shell with the execution output.

```
6.3.py - C:/Users/GALIH/AppData/Local/Programs/Python/Python38-32/6.3.py (3.8.2)
File Edit Format Run Options Window Help

def quickSort(A):
    quickSortBantu(A, 0, len(A) - 1)

def quickSortBantu(A, awal, akhir):
    if awal < akhir:
        titikBelah = partisi(A, awal, akhir)
        quickSortBantu(A, awal, titikBelah - 1)
        quickSortBantu(A, titikBelah + 1, akhir)

def partisi(A, awal, akhir):
    nilaiPivot = A[awal]

    penandaKiri = awal + 1
    penandaKanan = akhir

    selesai = False
    while not selesai:
        while penandaKiri <= penandaKanan and A[penandaKiri] <= nilaiPivot:
            penandaKiri = penandaKiri + 1
        while A[penandaKanan] >= nilaiPivot and penandaKanan >= penandaKiri:
            penandaKanan = penandaKanan - 1
        if penandaKanan < penandaKiri:
            selesai = True
        else:
            temp = A[penandaKiri]
            A[penandaKiri] = A[penandaKanan]
            A[penandaKanan] = temp

    temp = A[awal]
    A[awal] = A[penandaKanan]
    A[penandaKanan] = temp

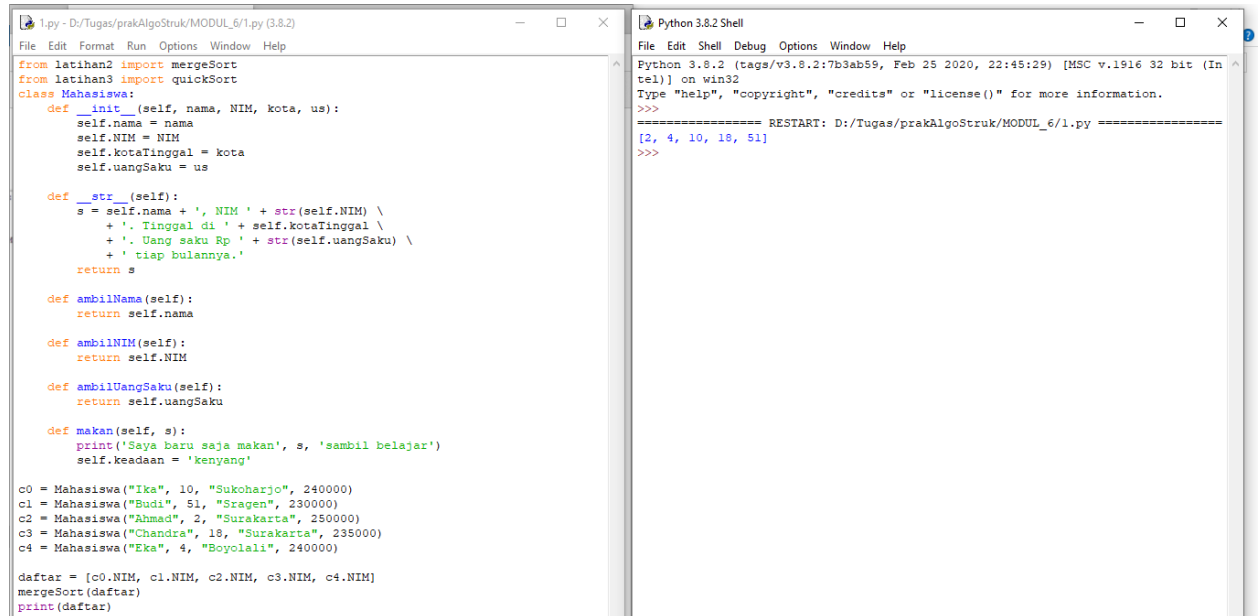
    return penandaKanan

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) [MSC v.1916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
==== RESTART: C:/Users/GALIH/AppData/Local/Programs/Python/Python38-32/6.3.py ====
>>> alist = [54,26,93,17,77,31,44,55,20]
>>> quickSort(alist)
>>> print(alist)
[17, 20, 26, 31, 44, 54, 55, 77, 93]
>>>
```

- Tugas

1.



The screenshot shows a Python IDE with two windows. The left window displays a Python script for a class-based program. The right window shows the Python 3.8.2 Shell with the execution output.

```
1.py - D:/Tugas/prakAlgoStruk/MODUL_6/1.py (3.8.2)
File Edit Format Run Options Window Help

from latihan2 import mergeSort
from latihan3 import quickSort
class Mahasiswa:
    def __init__(self, nama, NIM, kota, us):
        self.nama = nama
        self.NIM = NIM
        self.kotaTinggal = kota
        self.uangSaku = us

    def __str__(self):
        s = self.nama + ', NIM ' + str(self.NIM) \
            + '. Tinggal di ' + self.kotaTinggal \
            + '. Uang saku Rp ' + str(self.uangSaku) \
            + ' tiap bulannya.'
        return s

    def ambilNama(self):
        return self.nama

    def ambilNIM(self):
        return self.NIM

    def ambilUangSaku(self):
        return self.uangSaku

    def makan(self, s):
        print('Saya baru saja makan', s, 'sambil belajar')
        self.keadaan = 'kenyang'

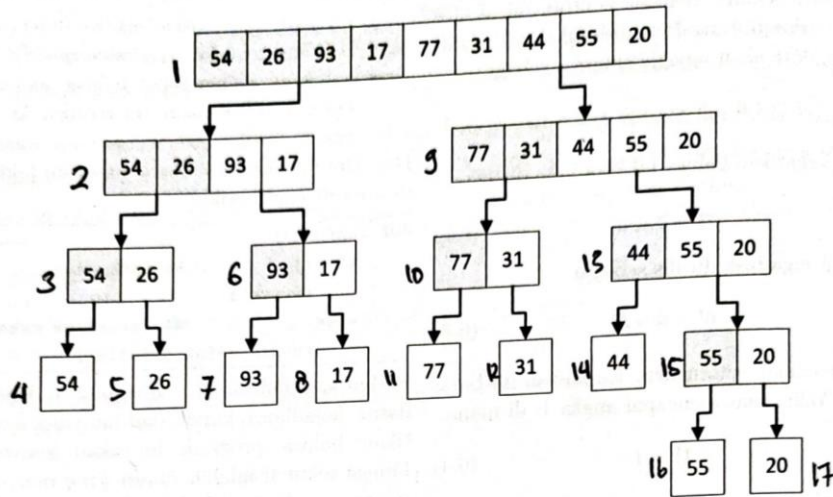
c0 = Mahasiswa("Ika", 10, "Sukoharjo", 240000)
c1 = Mahasiswa("Budi", 51, "Sragen", 230000)
c2 = Mahasiswa("Ahmad", 2, "Surakarta", 250000)
c3 = Mahasiswa("Chandra", 18, "Surakarta", 235000)
c4 = Mahasiswa("Eka", 4, "Boyolali", 240000)

daftar = [c0.NIM, c1.NIM, c2.NIM, c3.NIM, c4.NIM]
mergeSort(daftar)
print(daftar)

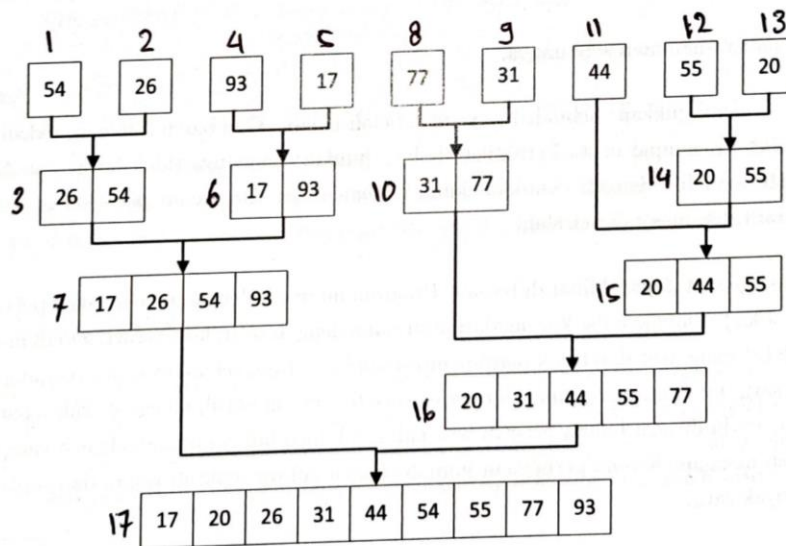
Python 3.8.2 Shell
File Edit Shell Debug Options Window Help

Python 3.8.2 (tags/v3.8.2:7b3ab59, Feb 25 2020, 22:45:29) [MSC v.1916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
==== RESTART: D:/Tugas/prakAlgoStruk/MODUL_6/1.py ====
>>>
[2, 4, 10, 18, 51]
>>>
```

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.

```
3.py - D:/Tugas/prakAlgoStruk/MODUL_6/3.py (3.8.2)
File Edit Format Run Options Window Help

from time import time as detik
from random import shuffle as kocok
import time
from latihan2 import mergeSort
from latihan3 import *

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

def selectionSort(A):
    n = len(A)
    for i in range(n-1):
        indexKecil = cariPosisiYangTerkecil(A, i, n)
        if indexKecil != i :
            swap(A, i, indexKecil)

def insertionSort(A):
    n = len(A)
    for i in range(1,n):
        nilai = A[i]
        pos = i
        while pos > 0 and nilai < A[pos - 1]:
            A[pos] = A[pos -1]
            pos = pos -1
        A[pos] = nilai

def swap(A,p,q):
    tmp = A[p]
    A[p] = A[q]
    A[q] = tmp

def cariPosisiYangTerkecil(A,darisini, sampaisini):
    posisiYangTerkecil = darisini
    for i in range (darisini+1, sampaisini):
        if A[i] < A[posisiYangTerkecil]:
            posisiYangTerkecil = i

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) [MSC v.1916 32 bit (In
tel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:/Tugas/prakAlgoStruk/MODUL_6/3.py =====
bubble: 7.50031 detik
selection: 3.05813 detik
insertion: 3.42932 detik
merge: 0.0479023 detik
quick: 0.0299196 detik
>>>
```

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

Proses 1

Proses 2

Proses 3

Proses 4

B. Quick sort

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

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

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				

5.

5.py - D:/Tugas/prakAlgoStruk/MODUL_5/5.py (3.8.2)
File Edit Format Run Options Window Help

```

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)

```

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) [MSC v.1916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:/Tugas/prakAlgoStruk/MODUL_5/5.py =====
>>> x = merge_sort([5,7,44,53,20,16,22,4,8])
>>> print(x)
[4, 5, 7, 8, 16, 20, 22, 44, 53]
>>>

Ln: 39 Col: 0
Ln: 8 Col: 4

6.

The screenshot shows a Python 3.8.2 IDE with two windows. The left window, titled '6.py - D:/Tugas/prakAlgoStruk/MODUL_6/6.py (3.8.2)', contains the following code:

```
def quickSort(A):
    quicksorthelp(A, 0, len(A))

def quicksorthelp(A, low, high):
    result = 0
    if low < high:
        pivot_location, result = Partition(A, low, high)
        result += quicksorthelp(A, low, pivot_location)
        result += quicksorthelp(A, pivot_location + 1, high)
    return result

def Partition(A, low, high):
    result = 0
    pivot, pidx = median_of_three(A, low, high)
    A[low], A[pidx] = A[pidx], A[low]
    i = low + 1
    for j in range(low + 1, high, 1):
        result += 1
        if A[j] < pivot:
            A[i], A[j] = A[j], A[i]
            i += 1
    A[low], A[i - 1] = A[i - 1], A[low]
    return i - 1, result

def median_of_three(A, low, high):
    mid = (low + high - 1) // 2
    a = A[low]
    b = A[mid]
    c = A[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
```

The right window, titled 'Python 3.8.2 Shell', shows the execution of the code:

```
Python 3.8.2 (tags/v3.8.2:7b3ab59, Feb 25 2020, 22:45:29) [MSC v.1916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:/Tugas/prakAlgoStruk/MODUL_6/6.py =====
>>> x = [35,12,24,53,19,33,46,78,93,125]
>>> quickSort(x)
>>> print(x)
[12, 19, 24, 33, 35, 46, 53, 78, 93, 125]
>>>
```

7.

The screenshot shows a Python 3.8.2 IDE with two windows. The left window, titled '7.py - D:/Tugas/prakAlgoStruk/MODUL_6/7.py (3.8.2)', contains the following code:

```
from time import time as detik
from random import shuffle as kocok
import nomor5 # mergeSort baru
import nomor6 # quickSort baru
import nomor3 # mergeSort dan quickSort awal
k = [i for i in range(1, 6000)]
kocok(k)

merA = k[:]
merB = k[:]
quiA = k[:]
quiB = k[:]

# merge Sort baru
aw = detik(); nomor5.merge_sort(merB); ak = detik(); print('merge sort baru : %g d' % (ak-aw))
# Quick Sort baru
aw = detik(); nomor6.quickSort(quiB); ak = detik(); print('quick sort baru : %g d' % (ak-aw))

# Merge Sort dan Quick Sort awal
aw = detik(); nomor3.mergeSort(merA); ak = detik(); print('merge sort awal : %g d' % (ak-aw))
aw = detik(); nomor3.quickSort(quiA); ak = detik(); print('quick sort awal : %g d' % (ak-aw))
```

The right window, titled 'Python 3.8.2 Shell', shows the execution of the code:

```
Python 3.8.2 (tags/v3.8.2:7b3ab59, Feb 25 2020, 22:45:29) [MSC v.1916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:/Tugas/prakAlgoStruk/MODUL_6/7.py =====
bubble: 8.1784 detik
selection: 3.27725 detik
insertion: 3.79581 detik
merge: 0.047755 detik
quick: 0.0307767 detik
merge sort baru : 0.0528617 detik
quick sort baru : 0.0598218 detik
merge sort awal : 0.0814214 detik
quick sort awal : 0.0368686 detik
>>>
```

8.

The image shows a screenshot of a Python IDE with two windows. The left window, titled 'nomor8.py - D:/Tugas/prakAlgoStruk/MODUL_6/nomor8.py (3.8.2)', contains the following code:

```
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
```

The right window, titled 'Python 3.8.2 Shell', shows the output of the program after a restart:

```
Python 3.8.2 (tags/v3.8.2:7b3ab59, Feb 25 2020, 22:45:29) [MSC v.1916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:/Tugas/prakAlgoStruk/MODUL_6/nomor8.py =====
List 1 :
3
7
12
13
14
List 2 :
1
10
26
Merged List :
1
3
7
10
12
13
14
26
>>>
```

The status bars at the bottom of the windows indicate 'Ln: 80 Col: 0' for the editor and 'Ln: 24 Col: 4' for the shell.