

PRAKTIKUM ALGORITMA DAN STRUKTUR DATA

MODUL 4

Pencarian



Oleh : Fariz Taufiqul Hafidz

Nim : L200210192

Kelas : F

**PROGRAM STUDI TEKNIK INFORMATIKA
FAKULTAS KOMUNIKASI DAN INFORMATIKA
UNIVERSITAS MUHAMMADIYAH SURAKARTA**

2023

I. Percobaan

```
Modul 4.py X
E: > Kuliah > Semester 4 > Praktikum ASD > Modul 4 > Modul 4.py > ...
1
2 def carilurus( wadah, target):
3     n = len(wadah)
4     for i in range (n):
5         if wadah[i] == target:
6             return True
7     return False
8
9 A = [10, 51, 2, 18, 4, 31, 13, 5, 23, 64, 29]
10 print(carilurus(A, 31))
11 print(carilurus(A, 8))
```

```
PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE
Python Debug Console + - [ ] [X] ... - X

Windows PowerShell
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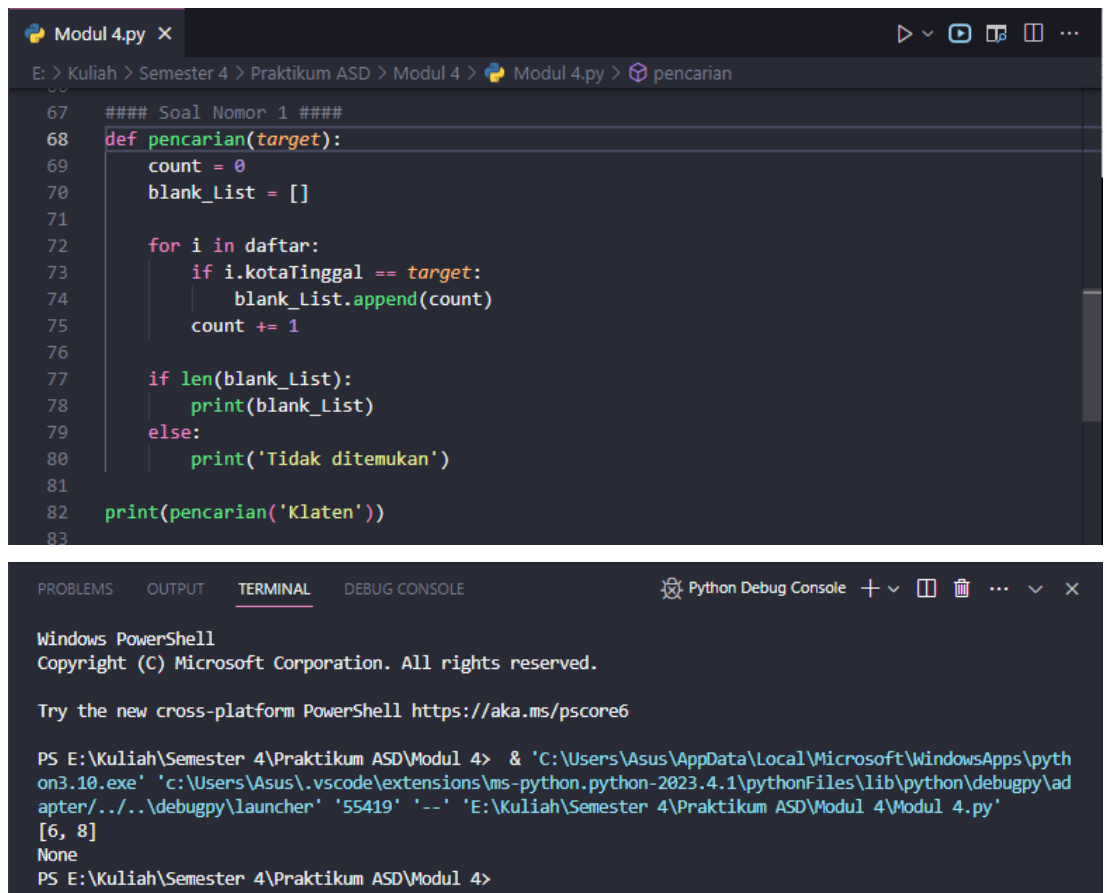
Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python-2023.4.1\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '54679' '--' 'E:\Kuliah\Semester 4\Praktikum ASD\Modul 4\Modul 4.py'
True
False
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4>
```

```
Modul 4.py X
E: > Kuliah > Semester 4 > Praktikum ASD > Modul 4 > Modul 4.py > ...
14 class mhsTIF ():
15     def __init__(self,x,y,z,v):
16         self.nama = x
17         self.umur = y
18         self.kotaTinggal = z
19         self.UangSaku = v
20
21 c0 = mhsTIF('Ika',10,'Sukoharjo',240000)
22 c1 = mhsTIF('Budi',51,'Sragen',230000)
23 c2 = mhsTIF('Ahmad',2,'Surakarta',250000)
24 c3 = mhsTIF('Chandra',18,'Surakarta',235000)
25 c4 = mhsTIF('Eka',4,'Boyolali',240000)
26 c5 = mhsTIF('Fandi',31,'Salatiga',250000)
27 c6 = mhsTIF('Deni',13,'Klaten',245000)
28 c7 = mhsTIF('Galuh',5,'Wonogiri',245000)
29 c8 = mhsTIF('Janto',23,'Klaten',245000)
30 c9 = mhsTIF('Hasan',64,'Karanganyar',270000)
31 c10 = mhsTIF('Khalid',29,'Purwodadi',265000)
32
33 daftar = [c0, c1, c2, c3, c4, c5, c6, c7, c8, c9, c10]
34
35 target = 'Klaten'
36 for i in daftar:
37     if i.kotaTinggal == target:
38         print(i.nama + ' tinggal di ' + target)
```


II. Soal-soal untuk mahasiswa

1. Buatlah suatu fungsi pencarian yang, alih-alih mengembalikan True/False, mengembalikan semua index lokasi elemen yang dicari. Jadi, misal pada list daftar mahasiswa di halaman 40 kita mencari mahasiswa yang berasal dari Klaten, kita akan mendapatkan [6, 8]. Kalau yang dicari tidak ditemukan, fungsi ini akan mengembalikan list kosong.



The image shows a VS Code editor window with a file named 'Modul 4.py'. The code defines a function 'pencarian' that takes a 'target' parameter. It initializes 'count' to 0 and 'blank_List' to an empty list. It then iterates through a 'daftar' (which is not defined in the visible code but implied to be a list of student data). For each item 'i' in 'daftar', it checks if 'i.kotaTinggal' equals the 'target'. If true, it appends 'count' to 'blank_List' and increments 'count' by 1. After the loop, it checks if 'blank_List' is non-empty. If yes, it prints the list; otherwise, it prints 'Tidak ditemukan'. Finally, it calls 'pencarian('Klaten')' and prints the result.

```
67 ##### Soal Nomor 1 #####
68 def pencarian(target):
69     count = 0
70     blank_List = []
71
72     for i in daftar:
73         if i.kotaTinggal == target:
74             blank_List.append(count)
75             count += 1
76
77     if len(blank_List):
78         print(blank_List)
79     else:
80         print('Tidak ditemukan')
81
82 print(pencarian('Klaten'))
83
```

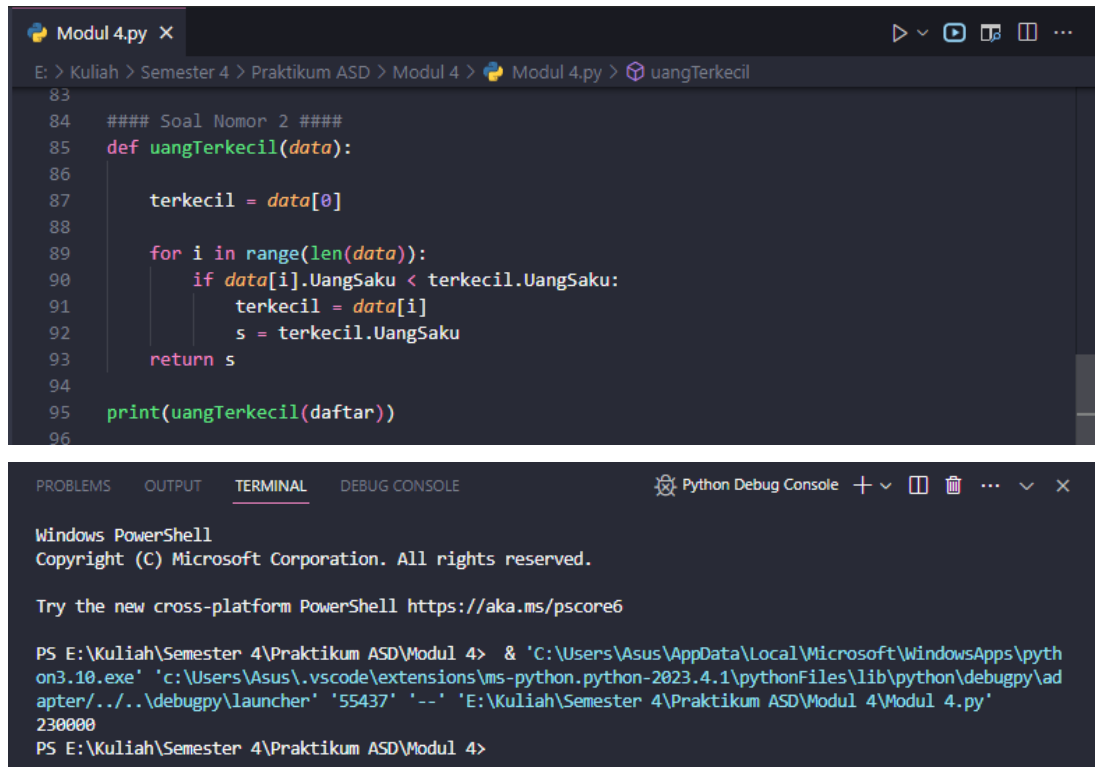
The terminal output shows the execution of the script. It displays the Windows PowerShell prompt, the copyright notice, and the command to run the script. The output of the script is '[6, 8]', followed by 'None' and the PowerShell prompt.

```
Windows PowerShell
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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python-2023.4.1\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '55419' '--' 'E:\Kuliah\Semester 4\Praktikum ASD\Modul 4\Modul 4.py'
[6, 8]
None
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4>
```

2. Dari list daftar mahasiswa di atas, buatlah fungsi untuk menemukan uang saku yang terkecil di antara mereka.



The image shows a VS Code editor window with a file named 'Modul 4.py'. The code defines a function 'uangTerkecil' that iterates through a list 'data' to find the minimum 'UangSaku' value. The function returns this value, which is then printed. Below the editor, the 'TERMINAL' tab is active, showing the command to run the script and the output '230000'.

```
83
84 ##### Soal Nomor 2 #####
85 def uangTerkecil(data):
86
87     terkecil = data[0]
88
89     for i in range(len(data)):
90         if data[i].UangSaku < terkecil.UangSaku:
91             terkecil = data[i]
92             s = terkecil.UangSaku
93     return s
94
95 print(uangTerkecil(daftar))
96
```

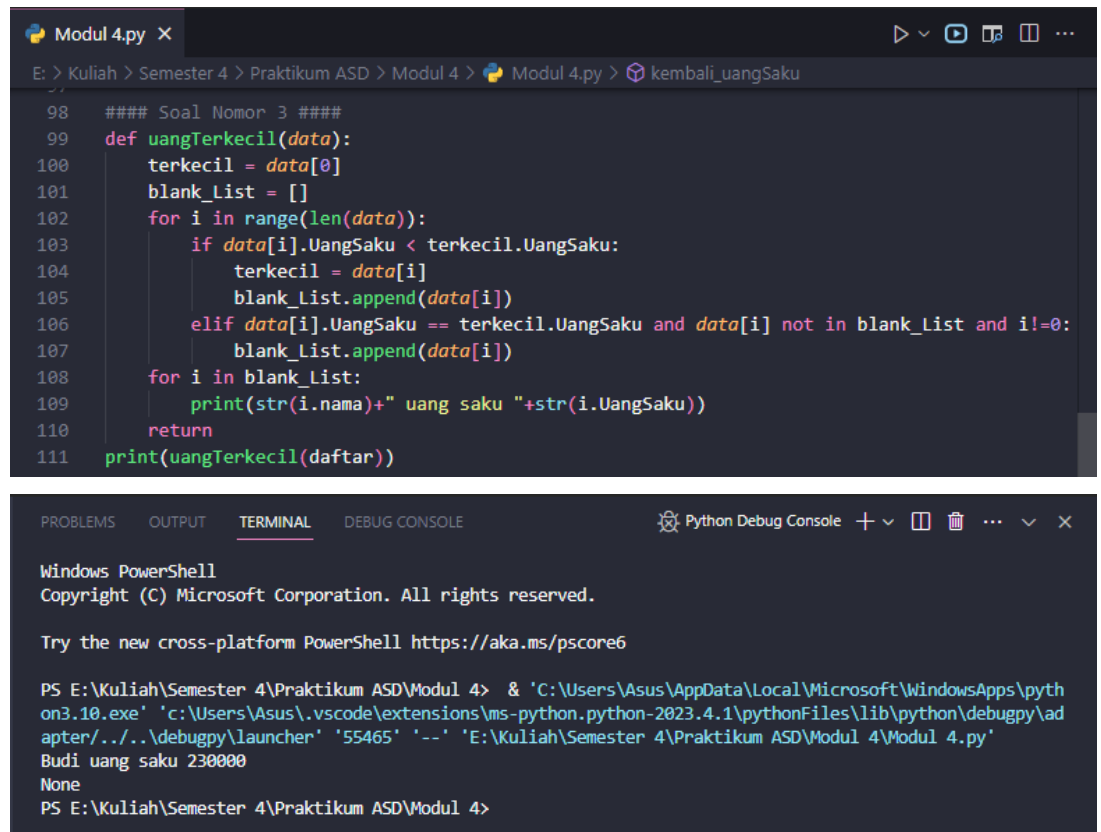
PROBLEMS OUTPUT **TERMINAL** DEBUG CONSOLE Python Debug Console + - [] [x] ... v x

Windows PowerShell
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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python-2023.4.1\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '55437' '--' 'E:\Kuliah\Semester 4\Praktikum ASD\Modul 4\Modul 4.py'
230000
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4>

3. Ubah program di atas agar mengembalikan objek mahasiswa yang mempunyai uang saku terkecil. Jika ada lebih dari satu mahasiswa yang uang sakunya terkecil, semua objek mahasiswa itu dikembalikan.



The image shows a VS Code editor window with a file named 'Modul 4.py'. The code is a Python function 'uangTerkecil' that takes a list of student objects 'data' and returns the student(s) with the lowest 'UangSaku' (pocket money). The function iterates through the list, updating 'terkecil' and 'blank_List' as it finds students with lower or equal pocket money. The terminal output shows the execution of the function with a sample student 'Budi' having a pocket money of 230000, and the function returning 'None'.

```
98 ##### Soal Nomor 3 #####
99 def uangTerkecil(data):
100     terkecil = data[0]
101     blank_List = []
102     for i in range(len(data)):
103         if data[i].UangSaku < terkecil.UangSaku:
104             terkecil = data[i]
105             blank_List.append(data[i])
106         elif data[i].UangSaku == terkecil.UangSaku and data[i] not in blank_List and i!=0:
107             blank_List.append(data[i])
108     for i in blank_List:
109         print(str(i.nama)+" uang saku "+str(i.UangSaku))
110     return
111 print(uangTerkecil(daftar))
```

Windows PowerShell
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Try the new cross-platform PowerShell <https://aka.ms/pscore6>

PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python-2023.4.1\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '55465' '--' 'E:\Kuliah\Semester 4\Praktikum ASD\Modul 4\Modul 4.py'

Budi uang saku 230000
None
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4>

4. Buatlah suatu fungsi yang mengembalikan semua objek mahasiswa yang uang sakunya kurang dari 250000.

```
Modul 4.py X
E: > Kuliah > Semester 4 > Praktikum ASD > Modul 4 > Modul 4.py > ...

112
113 ##### Soal Nomor 4 #####
114 def kembali_uangSaku(data):
115     blank_list = []
116     for i in range(len(data)):
117         if data[i].UangSaku < 250000:
118             blank_list.append(data[i])
119         elif data[i].UangSaku == 250000 and data[i] not in blank_list and i!=0:
120             blank_list.append(data[i])
121     for i in blank_list:
122         print(str(i.nama)+" uang saku "+str(i.UangSaku))
123     return
124
125 print(kembali_uangSaku(daftar))
126
```

```
PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE Python Debug Console + - [ ] [X] ... v x

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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python-2023.4.1\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '55481' '---' 'E:\Kuliah\Semester 4\Praktikum ASD\Modul 4\Modul 4.py'
Ika uang saku 240000
Budi uang saku 230000
Ahmad uang saku 250000
Chandra uang saku 235000
Eka uang saku 240000
Fandi uang saku 250000
Deni uang saku 245000
Galuh uang saku 245000
Janto uang saku 245000
None
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4>
```

5. Buatlah suatu program untuk mencari suatu item di sebuah linked list.

```
Modul 4.py X
E: > Kuliah > Semester 4 > Praktikum ASD > Modul 4 > Modul 4.py > ...

127 ##### Soal Nomor 5 #####
128 class node(object):
129     def __init__(self, data, next=None):
130         self.data = data
131         self.next = next
132
133 def cari(head, cari):
134
135     curr = head
136
137     while curr != None:
138         if curr.data == cari:
139             return True
140         curr = curr.next
141     return False
142
143
144 a = node(2)
145 b = node(1)
146 c = node(5)
147 d = node(19)
148
149 a.next = b
150 b.next = c
151 c.next = d
152
153 print(cari(a, 5))
```

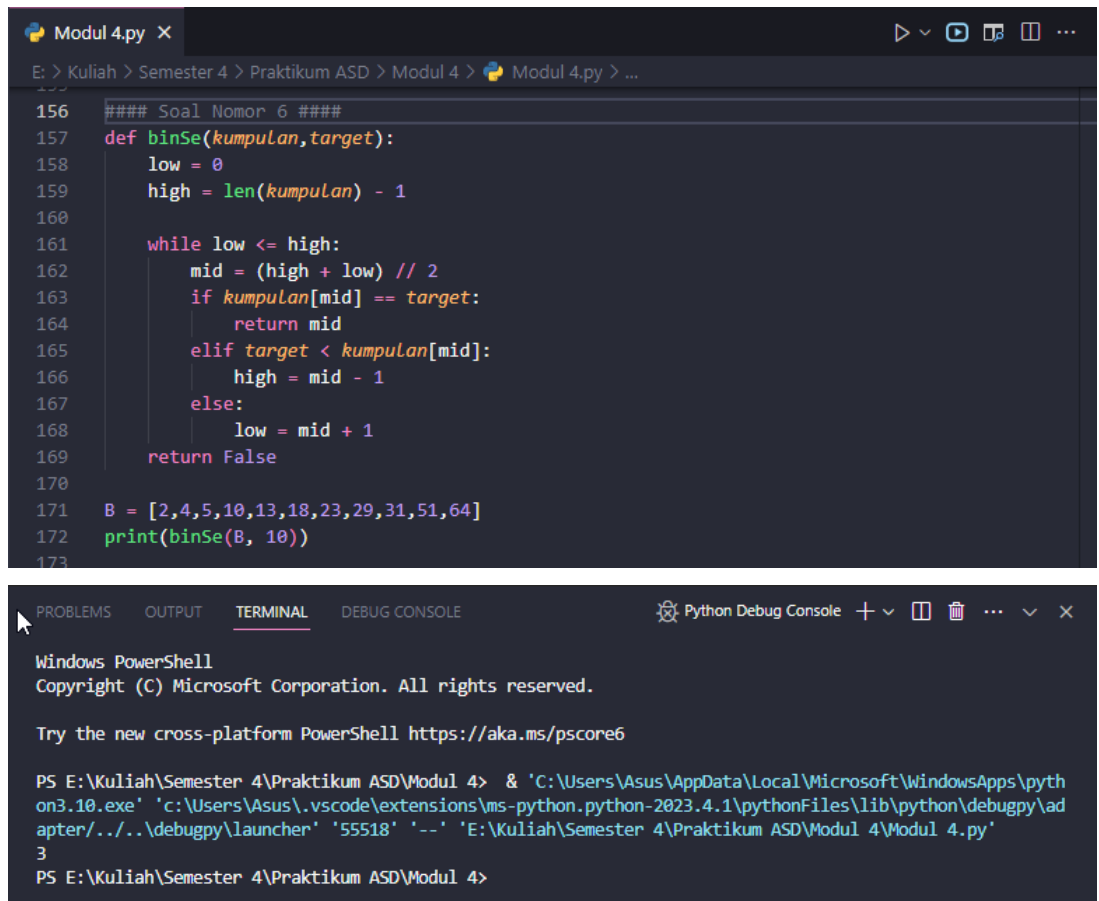
PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE Python Debug Console + - [] [X] ... ^ X

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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python-2023.4.1\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '55498' '--' 'E:\Kuliah\Semester 4\Praktikum ASD\Modul 4\Modul 4.py'
True
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4>

6. Binary search. Ubahlah fungsi binSe di halaman 43 agar mengembalikan index lokasi elemen yang ditemukan. Kalau tidak ketemu, akan mengembalikan False.



The image shows a screenshot of a Visual Studio Code editor window. The top part displays the code for a binary search function named `binSe` in a file named `Modul 4.py`. The code is as follows:

```
156 ##### Soal Nomor 6 #####
157 def binSe(kumpulan, target):
158     low = 0
159     high = len(kumpulan) - 1
160
161     while low <= high:
162         mid = (high + low) // 2
163         if kumpulan[mid] == target:
164             return mid
165         elif target < kumpulan[mid]:
166             high = mid - 1
167         else:
168             low = mid + 1
169     return False
170
171 B = [2,4,5,10,13,18,23,29,31,51,64]
172 print(binSe(B, 10))
173
```

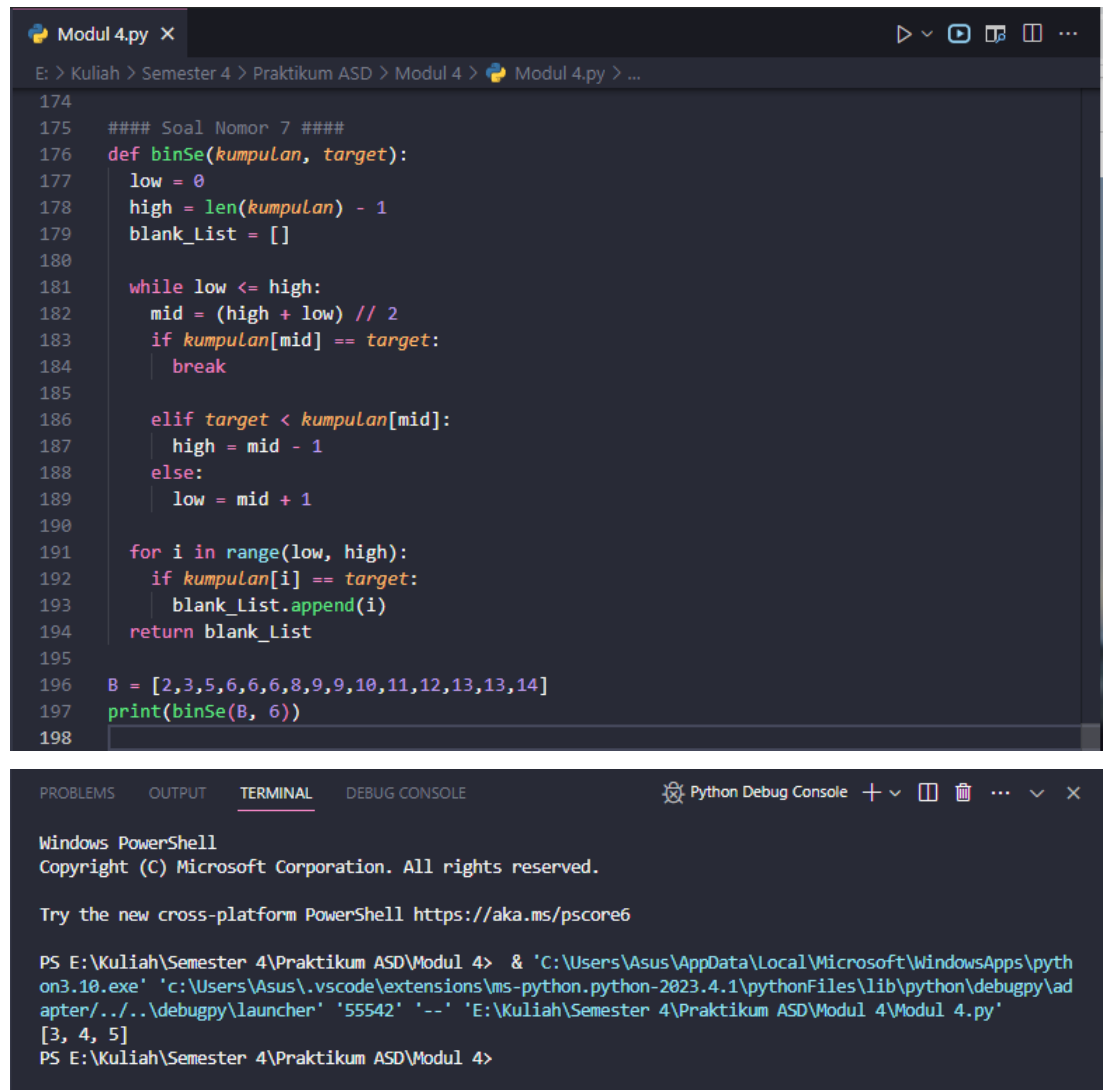
The bottom part of the image shows the terminal output of the code execution. The terminal is titled "Windows PowerShell" and displays the following text:

```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python-2023.4.1\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '55518' '---' 'E:\Kuliah\Semester 4\Praktikum ASD\Modul 4\Modul 4.py'
3
PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4>
```

7. Binary search. Ubahlah fungsi binSe itu agar mengembalikan semua index lokasi elemen yang ditemukan. Contoh: mencari angka 6 pada list [2, 3, 5, 6, 6, 6, 8, 9, 9, 10, 11, 12, 13, 13, 14] akan mengembalikan [3, 4, 5]. Karena sudahurut, “tinggal melihat kiri dan kanannya”.



```
174
175 ##### Soal Nomor 7 #####
176 def binSe(kumpulan, target):
177     low = 0
178     high = len(kumpulan) - 1
179     blank_List = []
180
181     while low <= high:
182         mid = (high + low) // 2
183         if kumpulan[mid] == target:
184             break
185
186         elif target < kumpulan[mid]:
187             high = mid - 1
188         else:
189             low = mid + 1
190
191     for i in range(low, high):
192         if kumpulan[i] == target:
193             blank_List.append(i)
194     return blank_List
195
196 B = [2,3,5,6,6,6,8,9,9,10,11,12,13,13,14]
197 print(binSe(B, 6))
198
```

PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE Python Debug Console + - [] [X] ... - X

Windows PowerShell
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PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4> & 'C:\Users\Asus\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Asus\.vscode\extensions\ms-python.python-2023.4.1\pythonFiles\lib\python\debugpy\adapter\..\..\debugpy\launcher' '55542' '--' 'E:\Kuliah\Semester 4\Praktikum ASD\Modul 4\Modul 4.py'

[3, 4, 5]

PS E:\Kuliah\Semester 4\Praktikum ASD\Modul 4>

8. Pada permainan tebak angka yang sudah kamu buat di Modul 1 (soal nomer 12, halaman 16), kalau angka yang harus ditebak berada di antara 1 dan 100, seharusnya maksimal jumlah tebakan adalah 7. Kalau antara 1 dan 1000, maksimal jumlah tebakan adalah 10. Mengapa seperti itu? Bagaimanakah polanya.

```
Modul 4.py X
E: > Kuliah > Semester 4 > Praktikum ASD > Modul 4 > Modul 4.py > ...
204 ##### Soal Nomor 8 #####
205 def binSearching(kumpulan, target):
206
207     low = 0
208     high = len(kumpulan) - 1
209
210     while low <= high:
211         mid = (high + low) // 2
212         if kumpulan[mid] == target:
213             return mid
214         elif kumpulan[mid] < target:
215             high = mid + 1
216         else :
217             low = mid + 1
218
219     return -1
220
221 b = [1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20]
222
223 """
224 untuk mencari berapa jumlah tebakan yang digunakan oleh Binary Search
225 yaitu dengan menggunakan Logaritma basis 2 (log2(n))
226 misalkan :
227     // apabila terdapat elemen array berjumlah 100 maka memiliki maksimal 7 kali tebakan
228     itu dikarenakan  $\log_2(100) = 6.643856189774725$  sehingga diperoleh angka 7
229     dapat juga diperoleh dari  $\log_2(128) = 7$  karena yang mendekati dari 100 adalah 128
230     // apabila terdapat elemen array berjumlah 1000 maka memiliki maksimal 10 kali tebakan
231     itu dikarenakan  $\log_2(1000) = 9.965784284662087$  sehingga diperoleh angka 10
232     dapat juga diperoleh dari  $\log_2(1024) = 10$  karena yang mendekati dari 1000 adalah 1024
233 """
```