

A.I

LAB TASK 4

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QUESTION 1&2:

1. Implement Min-Max Algorithm to find the optimal ans for the following value:

[12, 5, 2, 9, 3, 5, 23, 23]

2. Implement Min-Max Algorithm to find the optimal ans for the following value:

[12, 5, 2, 2, 3, 34, 23, 4]

CODE:

```
import math

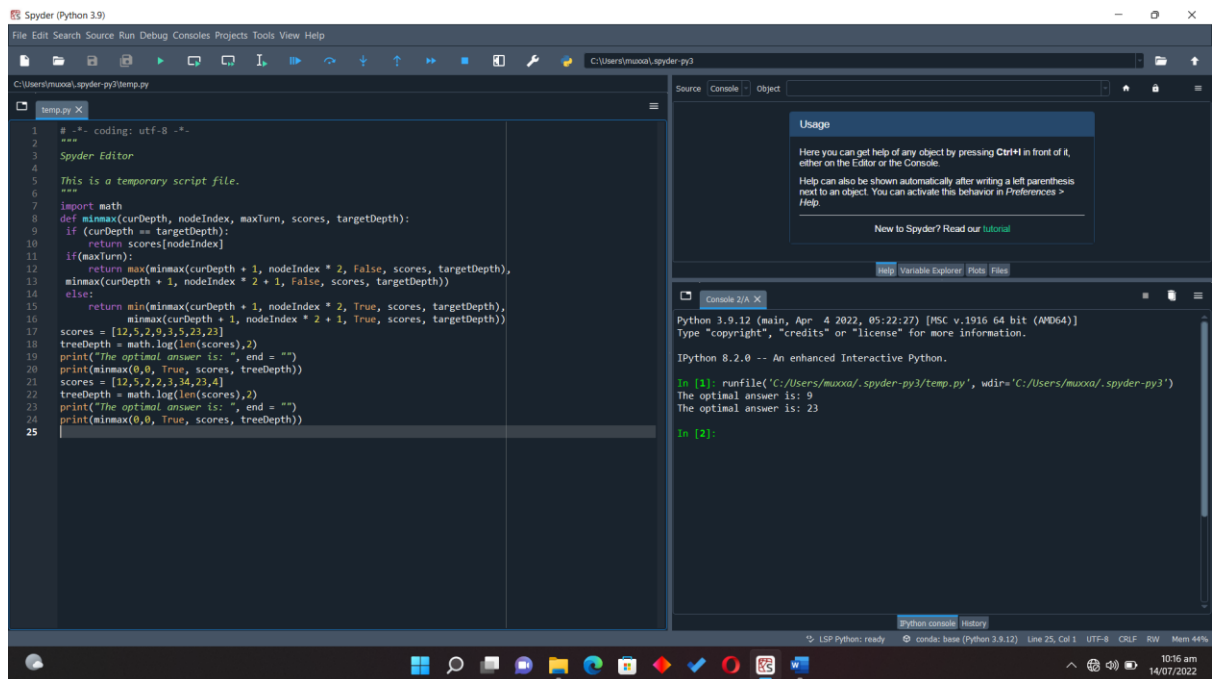
def minmax(curDepth, nodeIndex, maxTurn, scores, targetDepth):
    if (curDepth == targetDepth):
        return scores[nodeIndex]
    if(maxTurn):
        return max(minmax(curDepth + 1, nodeIndex * 2, False, scores, targetDepth),
minmax(curDepth + 1, nodeIndex * 2 + 1, False, scores, targetDepth))
    else:
        return min(minmax(curDepth + 1, nodeIndex * 2, True, scores, targetDepth),
minmax(curDepth + 1, nodeIndex * 2 + 1, True, scores, targetDepth))

scores = [12,5,2,9,3,5,23,23]
treeDepth = math.log(len(scores),2)
print("The optimal answer is: ", end = "")
print(minmax(0,0, True, scores, treeDepth))

scores = [12,5,2,2,3,34,23,4]
treeDepth = math.log(len(scores),2)
print("The optimal answer is: ", end = "")
print(minmax(0,0, True, scores, treeDepth))
```

Submitted to: Sir Ramzan Ali

OUTPUT:



The screenshot shows the Spyder Python IDE interface. The main editor displays a Python script named `temp.py` with the following code:

```
1 # -*- coding: utf-8 -*-
2 """
3 Spyder Editor
4 This is a temporary script file.
5 """
6 import math
7 def minmax(curDepth, nodeIndex, maxTurn, scores, targetDepth):
8     if (curDepth == targetDepth):
9         return scores[nodeIndex]
10    if (maxTurn):
11        return max(minmax(curDepth + 1, nodeIndex * 2, False, scores, targetDepth),
12                  minmax(curDepth + 1, nodeIndex * 2 + 1, False, scores, targetDepth))
13    else:
14        return min(minmax(curDepth + 1, nodeIndex * 2, True, scores, targetDepth),
15                  minmax(curDepth + 1, nodeIndex * 2 + 1, True, scores, targetDepth))
16 scores = [12,5,2,9,3,5,23,23]
17 treeDepth = math.log(len(scores),2)
18 print("The optimal answer is: ", end = "")
19 print(minmax(0,0, True, scores, treeDepth))
20 scores = [12,5,2,2,3,34,23,4]
21 treeDepth = math.log(len(scores),2)
22 print("The optimal answer is: ", end = "")
23 print(minmax(0,0, True, scores, treeDepth))
24
```

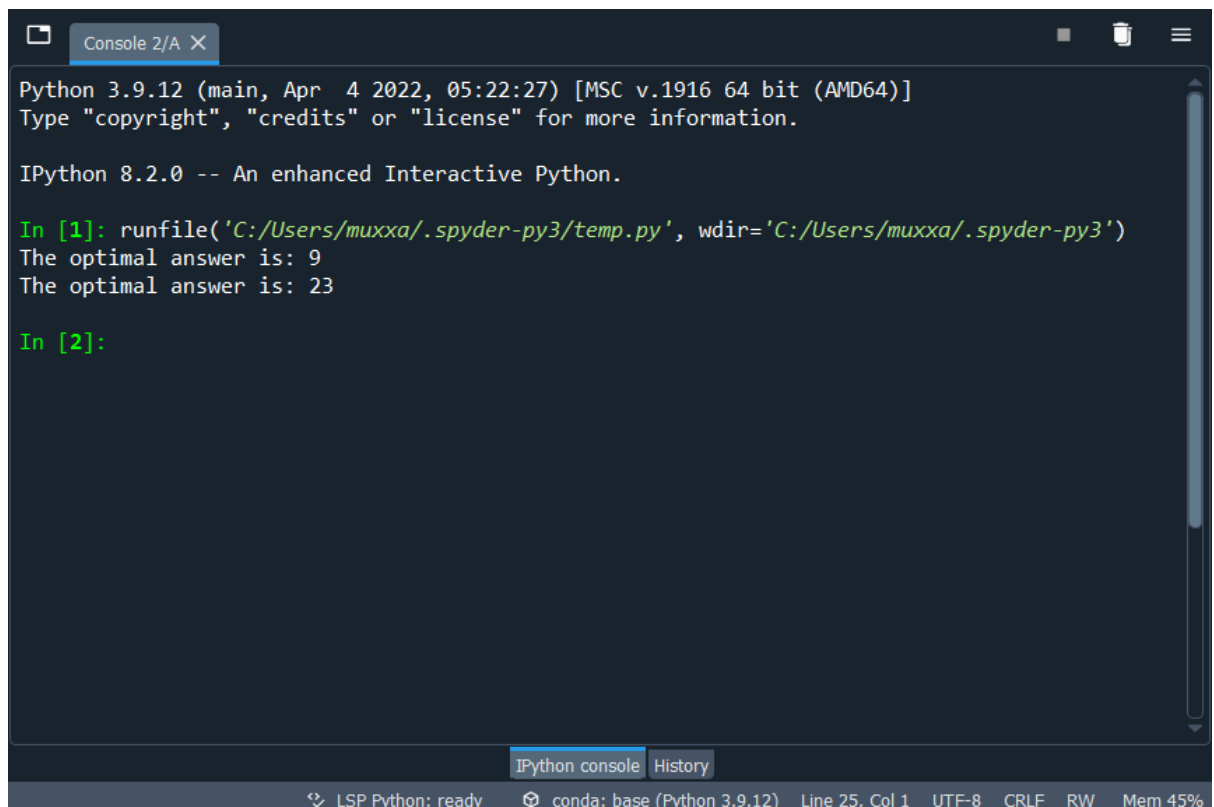
The IPython console on the right shows the execution of the script:

```
Python 3.9.12 (main, Apr 4 2022, 05:22:27) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 8.2.0 -- An enhanced Interactive Python.

In [1]: runfile('C:/Users/muxxa/.spyder-py3/temp.py', wdir='C:/Users/muxxa/.spyder-py3')
The optimal answer is: 9
The optimal answer is: 23

In [2]:
```



This is a close-up view of the IPython console window. It displays the following text:

```
Python 3.9.12 (main, Apr 4 2022, 05:22:27) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 8.2.0 -- An enhanced Interactive Python.

In [1]: runfile('C:/Users/muxxa/.spyder-py3/temp.py', wdir='C:/Users/muxxa/.spyder-py3')
The optimal answer is: 9
The optimal answer is: 23

In [2]:
```

The status bar at the bottom indicates: LSP Python: ready, conda: base (Python 3.9.12), Line 25, Col 1, UTF-8, CRLF, RW, Mem 45%.

Submitted to: Sir Ramzan Ali