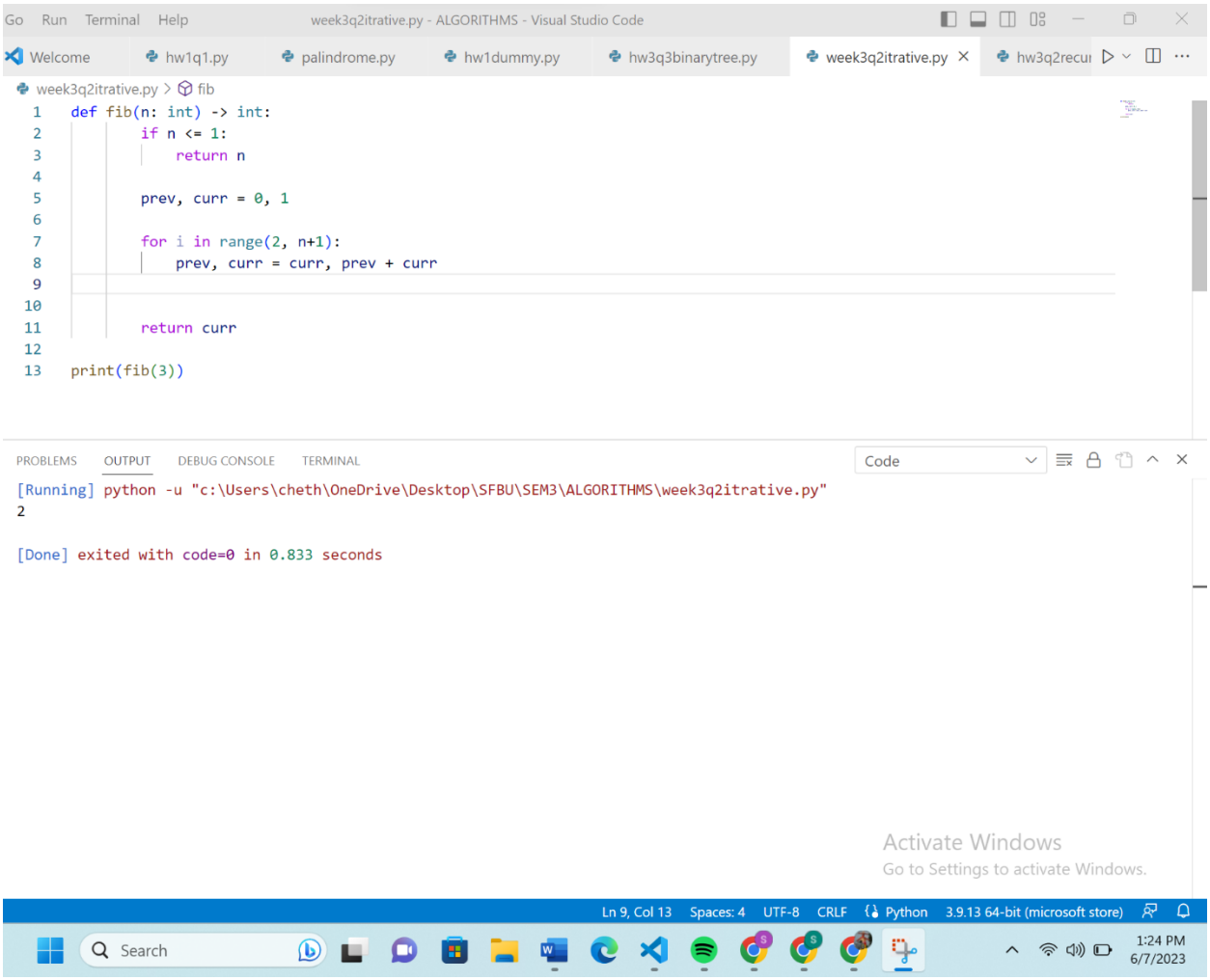
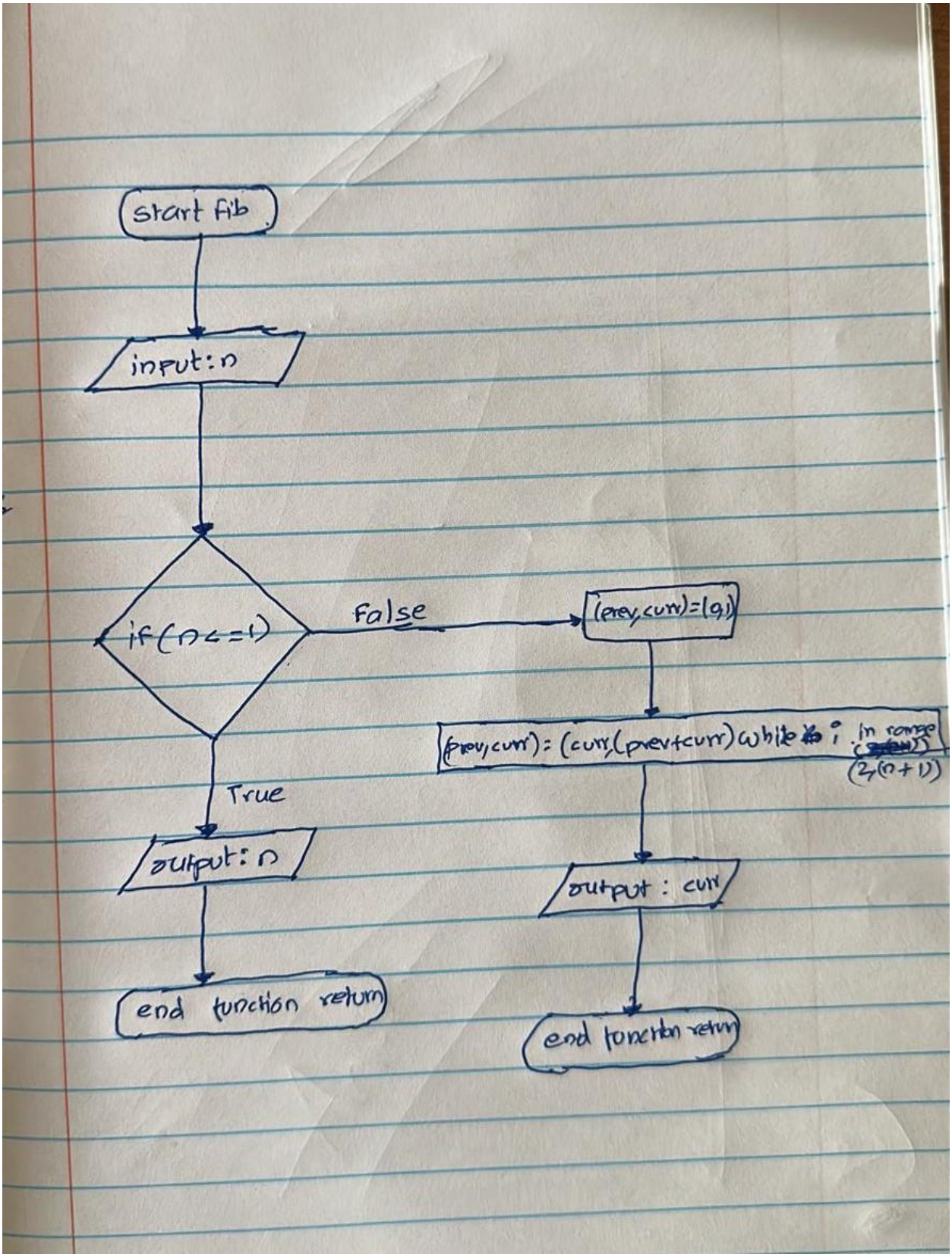
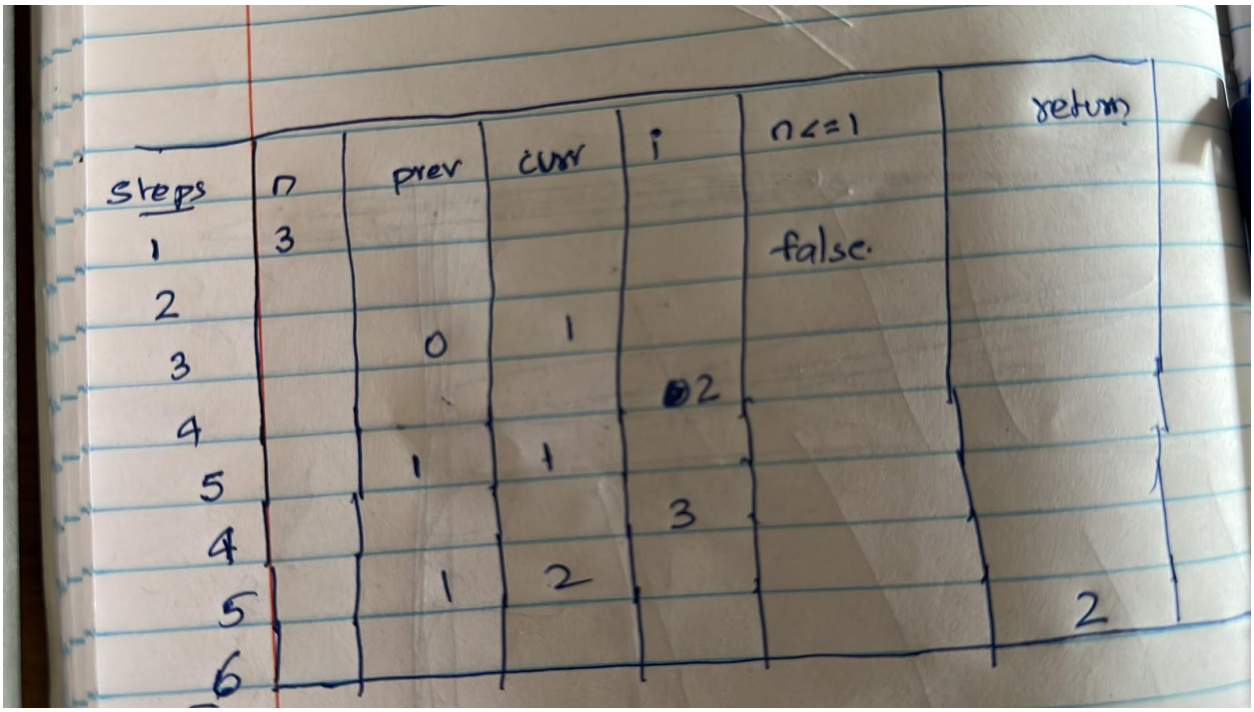
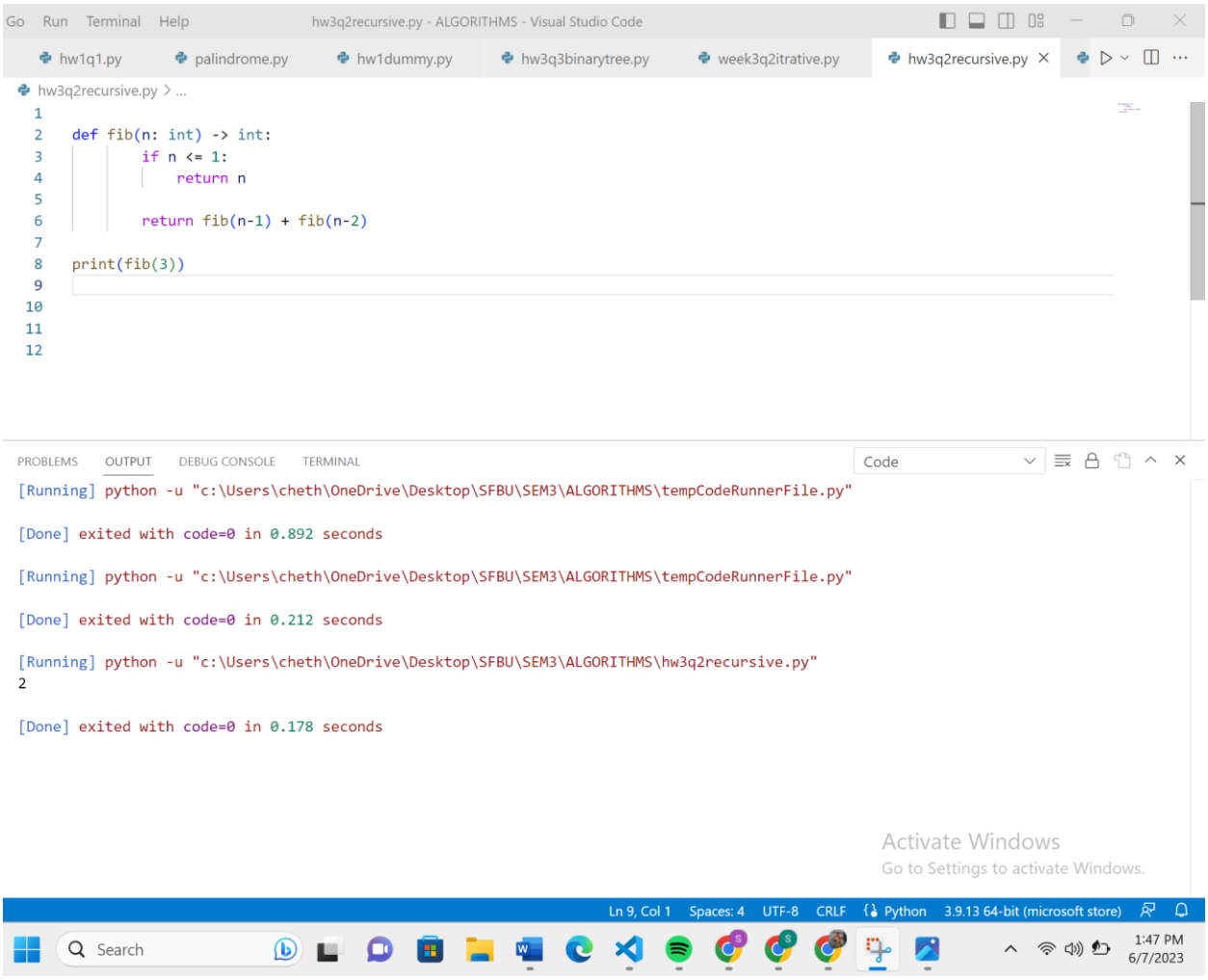
HW3q2

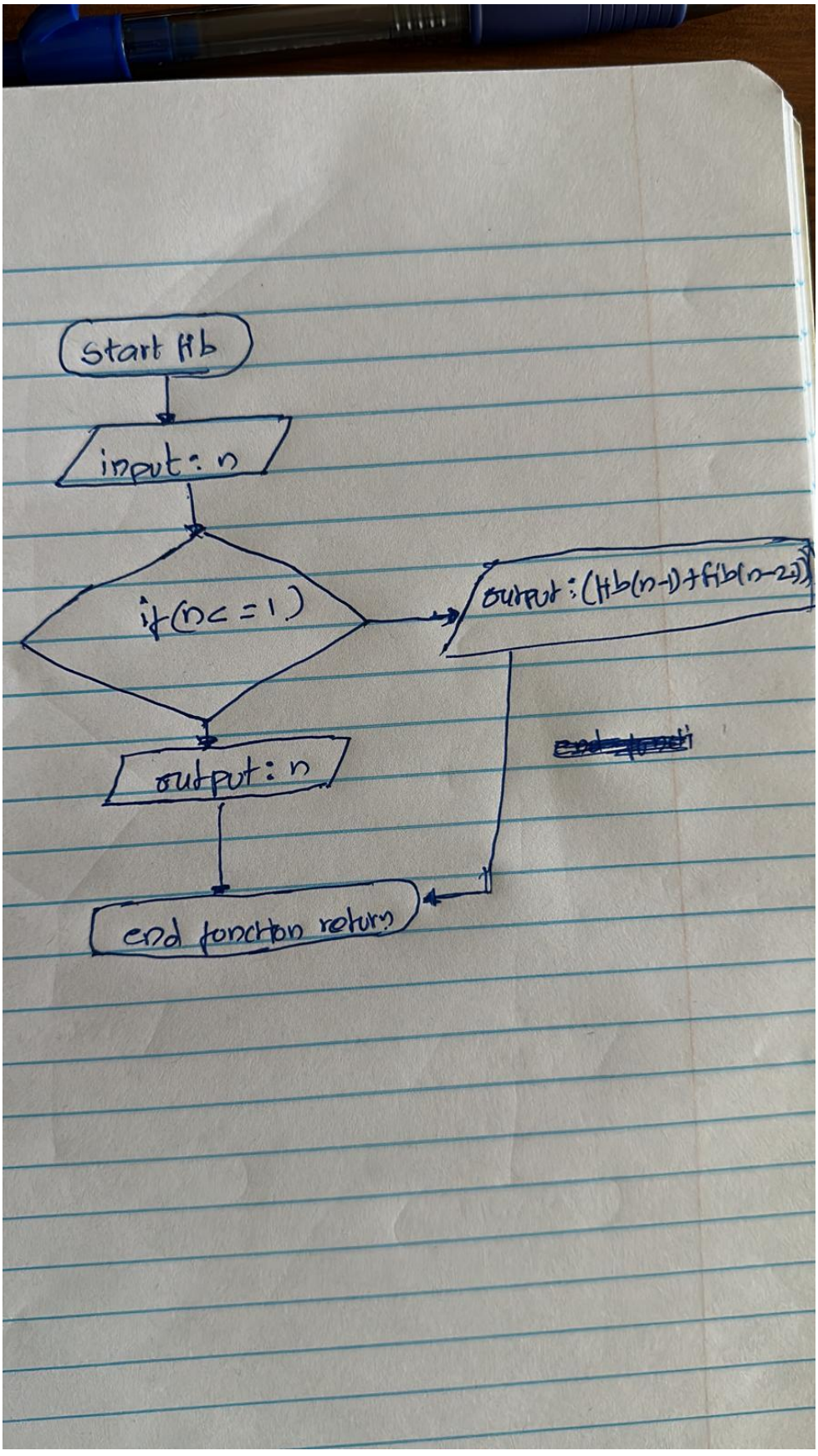

Go Run Terminal Help
week3q2itrative.py - ALGORITHMS - Visual Studio Code
Welcome
hw1q1.py
palindrome.py
hw1dummy.py
hw3q3binarytree.py
week3q2itrative.py
hw3q2recu
week3q2itrative.py > fib
1 def fib(n: int) -> int:
2 if n <= 1:
3 return n
4
5 prev, curr = 0, 1
6
7 for i in range(2, n+1):
8 prev, curr = curr, prev + curr
9
10
11 return curr
12
13 print(fib(3))
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Code
[Running] python -u "c:\Users\cheth\OneDrive\Desktop\SFBU\SEM3\ALGORITHMS\week3q2itrative.py"
2
[Done] exited with code=0 in 0.833 seconds
Activate Windows
Go to Settings to activate Windows.
Ln 9, Col 13
Spaces: 4
UTF-8
CRLF
Python
3.9.13 64-bit (microsoft store)
Search
1:24 PM
6/7/2023

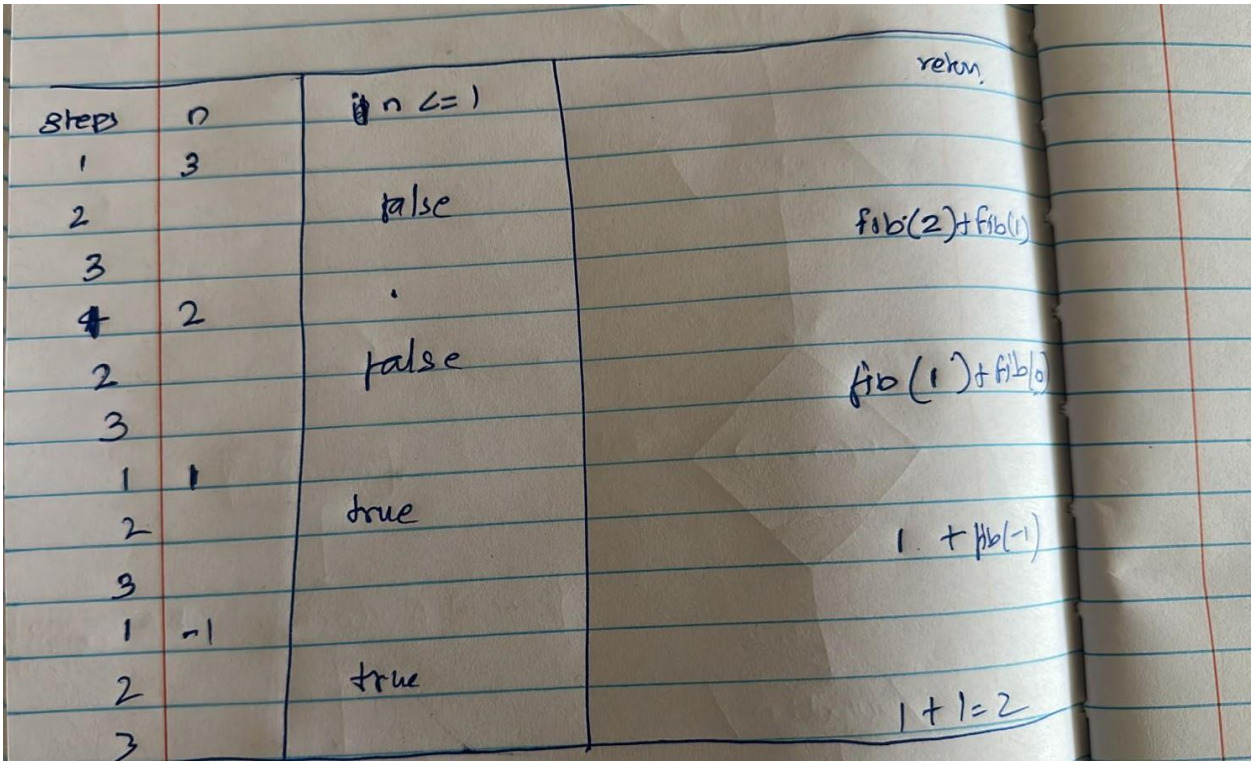

start fib
input: n
if (n<=1)
False
(prev, curr)=(0,1)
(prev, curr) = (curr, (prev+curr) while i in range (2,(n+1))
True
output: n
output : curr
end function return
end function return



Steps	n	prev	curr	i	n<=1	return
1	3				false	
2						
3		0	1			
4				2		
5		1	1			
4				3		
5		1	2			
6						2


Go Run Terminal Help
hw3q2recursive.py - ALGORITHMS - Visual Studio Code
hw1q1.py
palindrome.py
hw1dummy.py
hw3q3binarytree.py
week3q2itrative.py
hw3q2recursive.py
hw3q2recursive.py > ...
def fib(n: int) -> int:
if n <= 1:
return n
return fib(n-1) + fib(n-2)
print(fib(3))
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Code
[Running] python -u "c:\Users\cheth\OneDrive\Desktop\SFBU\SEM3\ALGORITHMS\tempCodeRunnerFile.py"
[Done] exited with code=0 in 0.892 seconds
[Running] python -u "c:\Users\cheth\OneDrive\Desktop\SFBU\SEM3\ALGORITHMS\tempCodeRunnerFile.py"
[Done] exited with code=0 in 0.212 seconds
[Running] python -u "c:\Users\cheth\OneDrive\Desktop\SFBU\SEM3\ALGORITHMS\hw3q2recursive.py"
2
[Done] exited with code=0 in 0.178 seconds
Activate Windows
Go to Settings to activate Windows.
Ln 9, Col 1
Spaces: 4
UTF-8
CRLF
Python
3.9.13 64-bit (microsoft store)
Search
1:47 PM
6/7/2023


start fib
input: n
if(n<=1)
output: n
output: (fib(n-1)+fib(n-2))
end function return


Steps
n
if n <= 1
return
1
3
2
false
fib(2)+fib(1)
3
4
2
2
false
fib(1)+fib(0)
3
1
1
2
true
1 + fib(-1)
3
1
-1
2
true
1+1=2
3

```python
import time
import sys

sys.setrecursionlimit(10**5)

# Recursive function with memoization
def recursive_function(n, memo={}):
    if n in memo:
        return memo[n]
    if n <= 1:
        return n
    result = recursive_function(n - 1) + recursive_function(n - 2)
    memo[n] = result
    return result

# Iterative function
def iterative_function(n):
    if n <= 1:
        return n
    a, b = 0, 1
    for _ in range(n - 1):
        a, b = b, a + b
    return b

# Test the functions

# Option 1: n = 20 cycles
n1 = 20

start_time = time.time()
result_recursive1 = recursive_function(n1)
end_time = time.time()
recursive_time1 = end_time - start_time

start_time = time.time()
result_iterative1 = iterative_function(n1)
end_time = time.time()
iterative_time1 = end_time - start_time

print(f"Option 1 - Recursive Result: {result_recursive1}")
print(f"Option 1 - Recursive Time: {recursive_time1} seconds")
print(f"Option 1 - Iterative Result: {result_iterative1}")
print(f"Option 1 - Iterative Time: {iterative_time1} seconds")
```

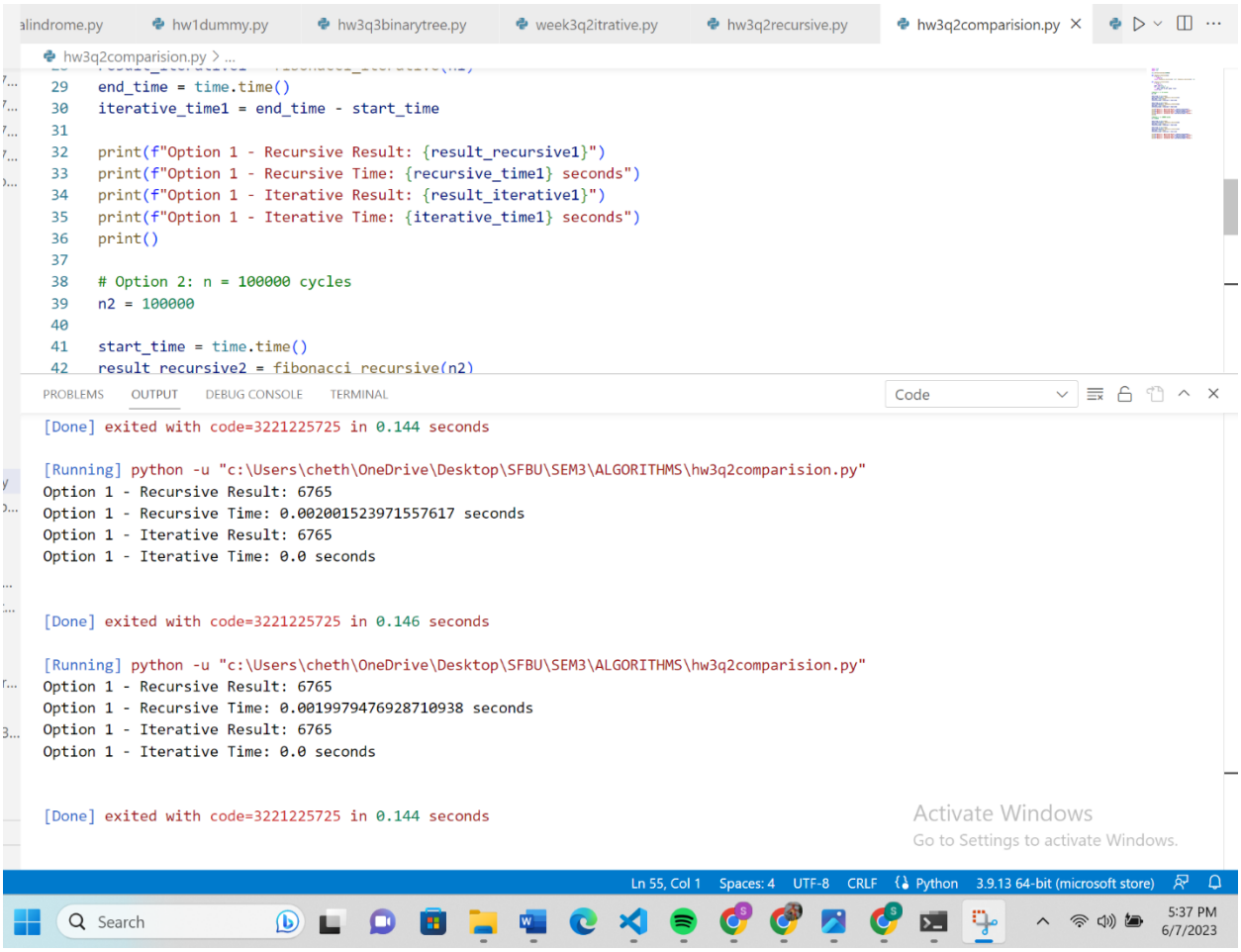
```python
print()

# Option 2: n = 100000 cycles
n2 = 100000

start_time = time.time()
result_recursive2 = recursive_function(n2)
end_time = time.time()
recursive_time2 = end_time - start_time

start_time = time.time()
result_iterative2 = iterative_function(n2)
end_time = time.time()
iterative_time2 = end_time - start_time

print(f"Option 2 - Recursive Result: {result_recursive2}")
print(f"Option 2 - Recursive Time: {recursive_time2} seconds")
print(f"Option 2 - Iterative Result: {result_iterative2}")
print(f"Option 2 - Iterative Time: {iterative_time2} seconds")
```



-

Option	Iterative	Recursive
n = 20 cycles	The program's execution time is 0sec	The program's execution time is 0.002sec??
n = 100000 cycles	Program crashing	The program has segmentation fault after running 1000 cyccles

Big-O	O(n)	2^n