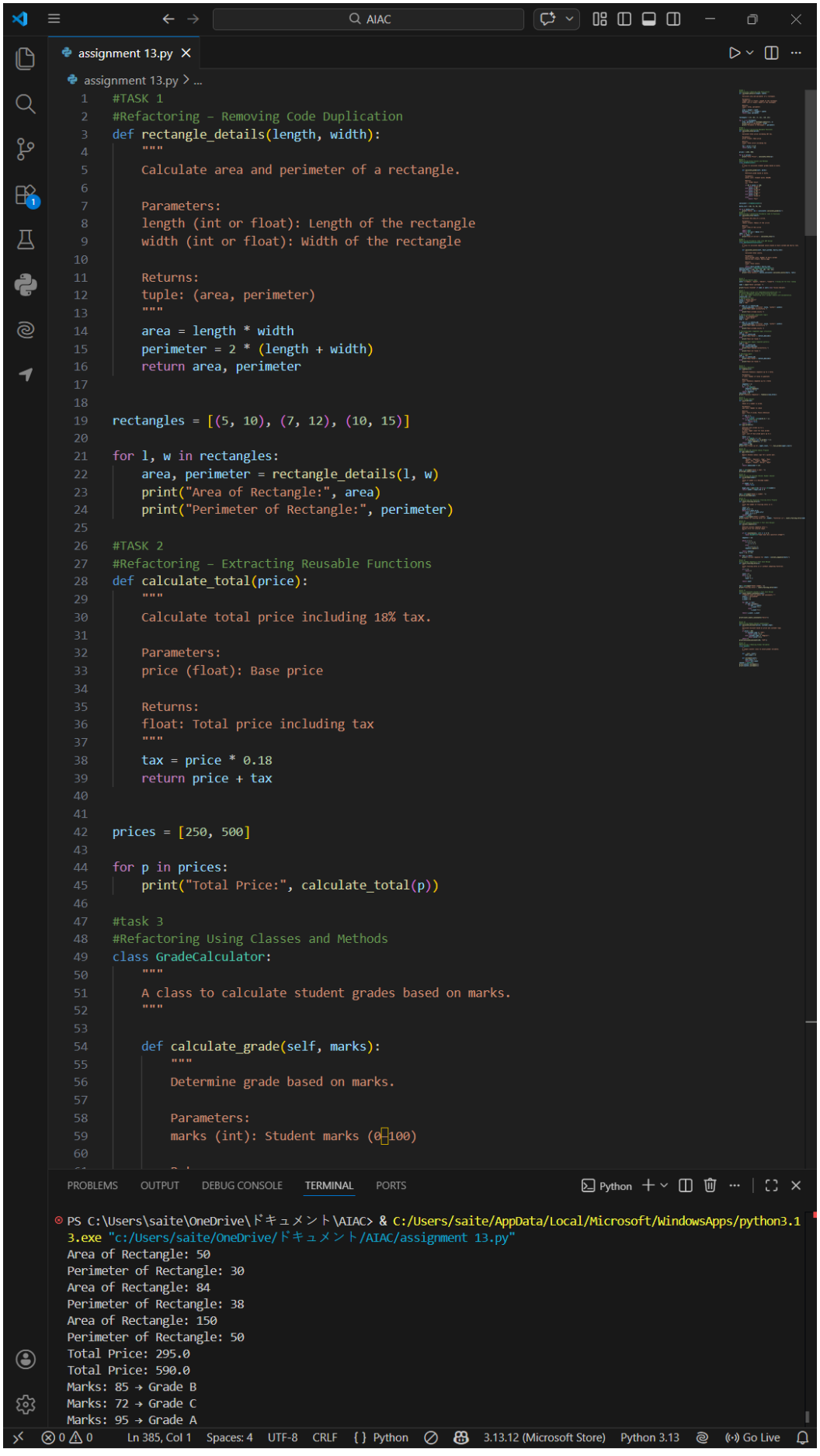
AI ASSISTED CODING

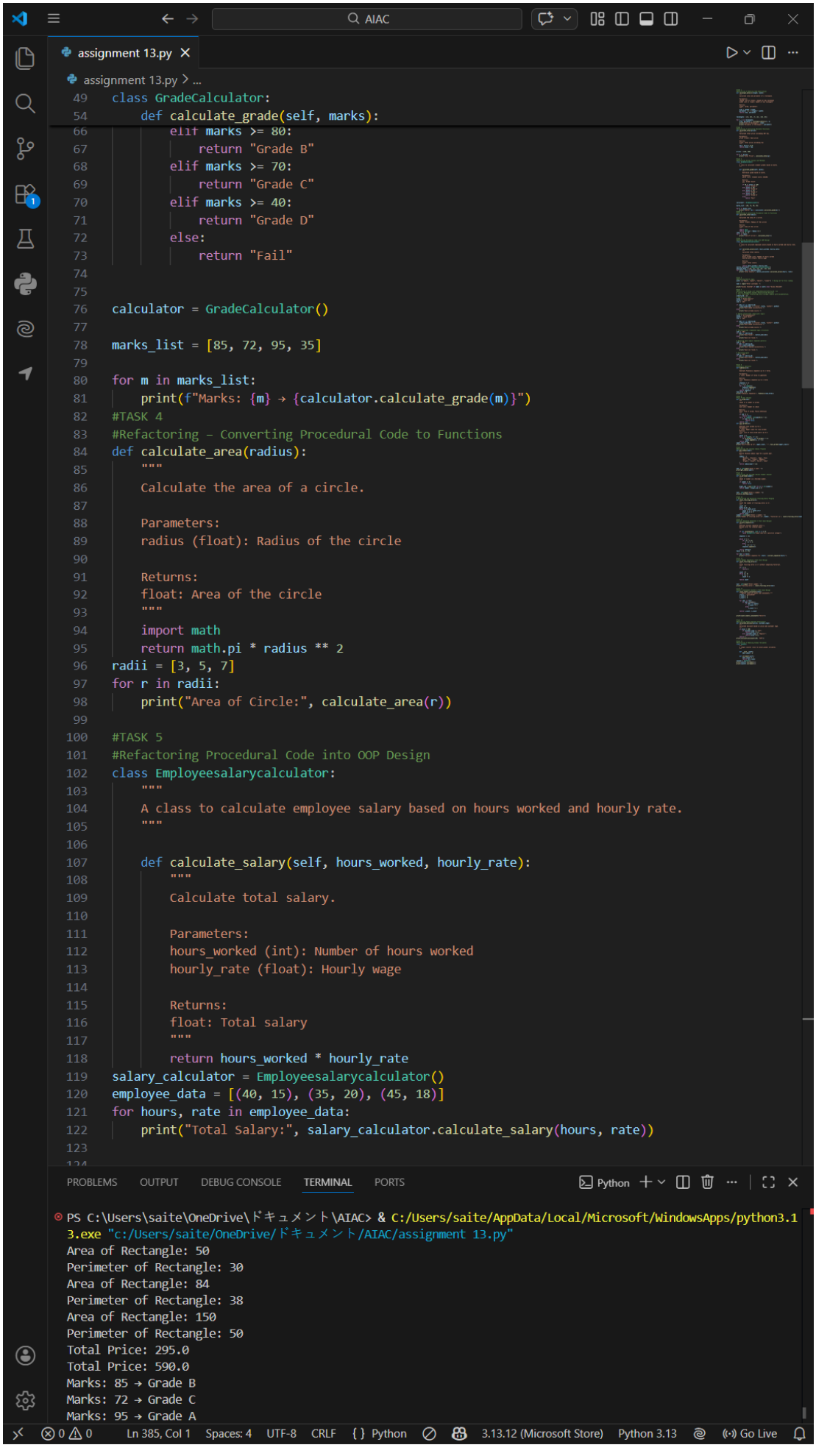
Assignment -13

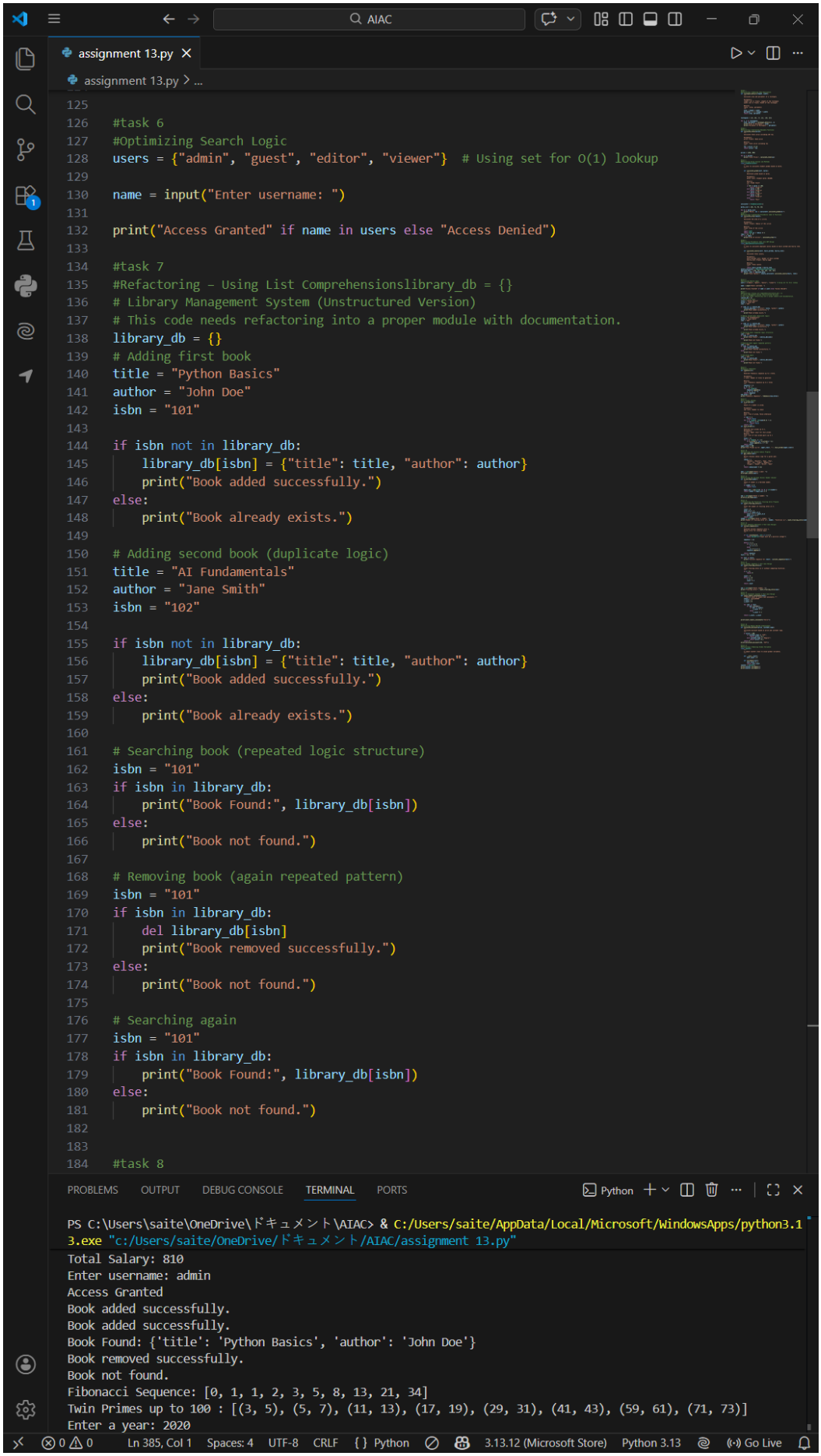
Name : Miryala Sai Teja

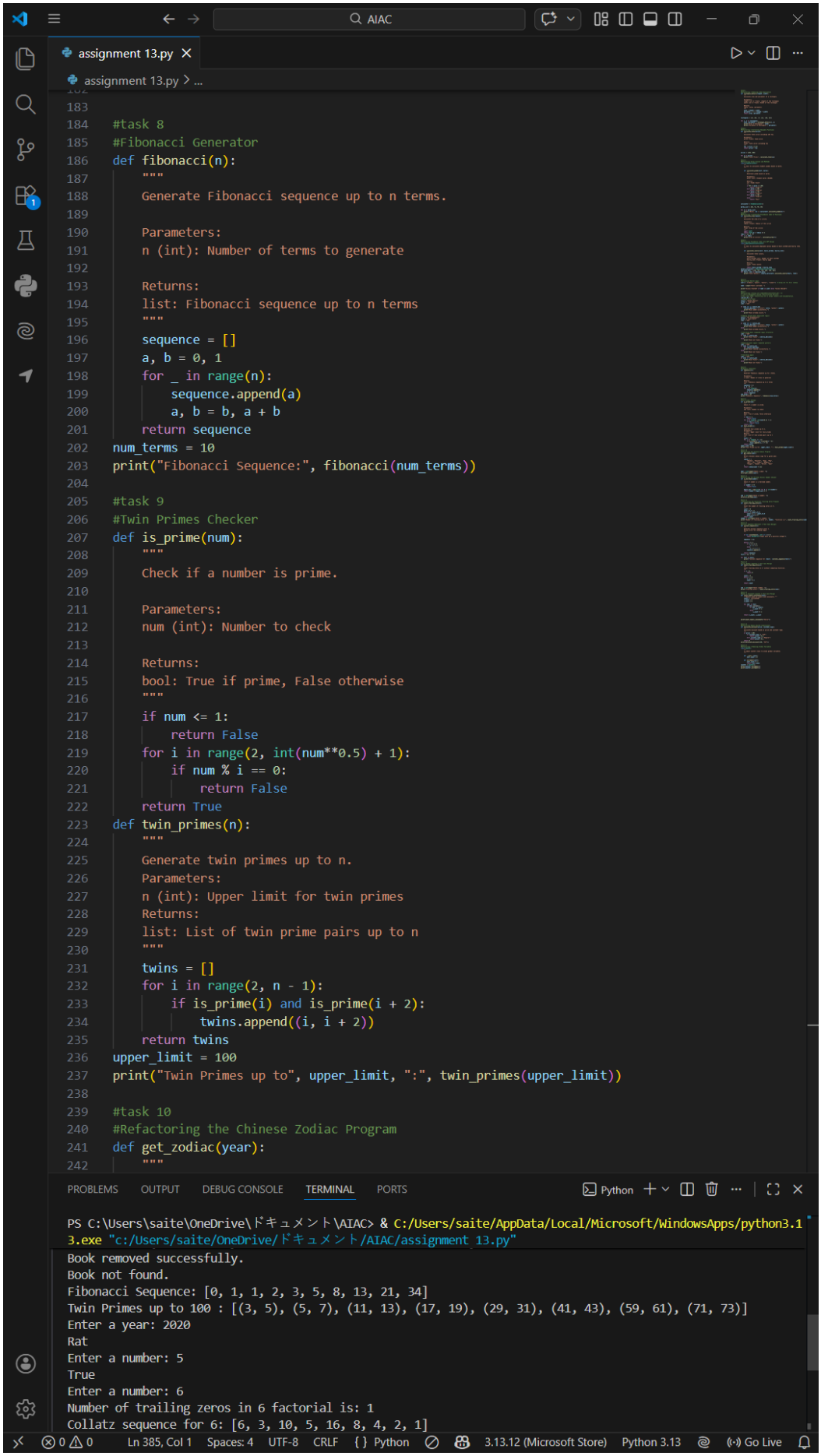
ID:2303A51930

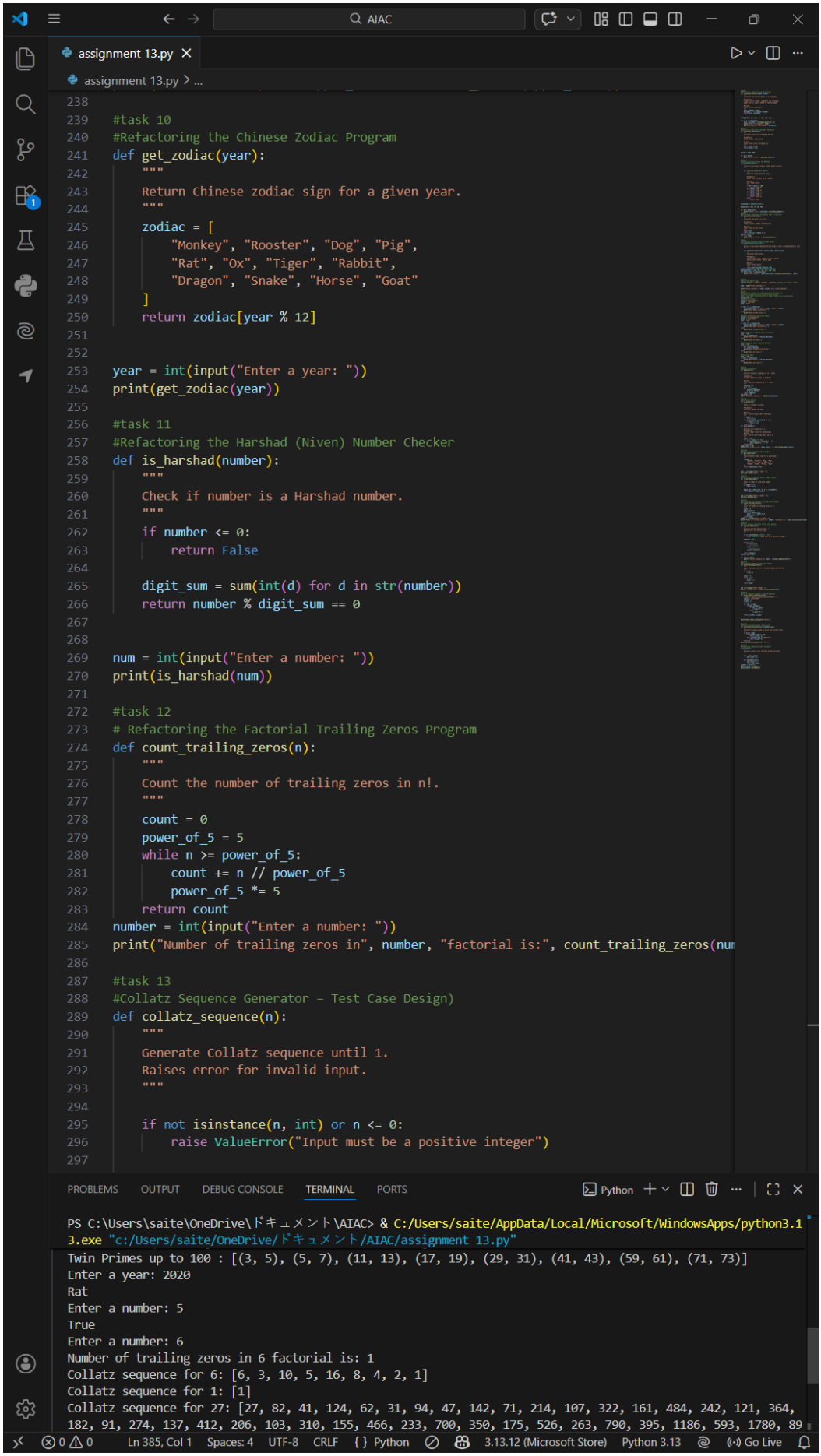
Date:27-02-2026

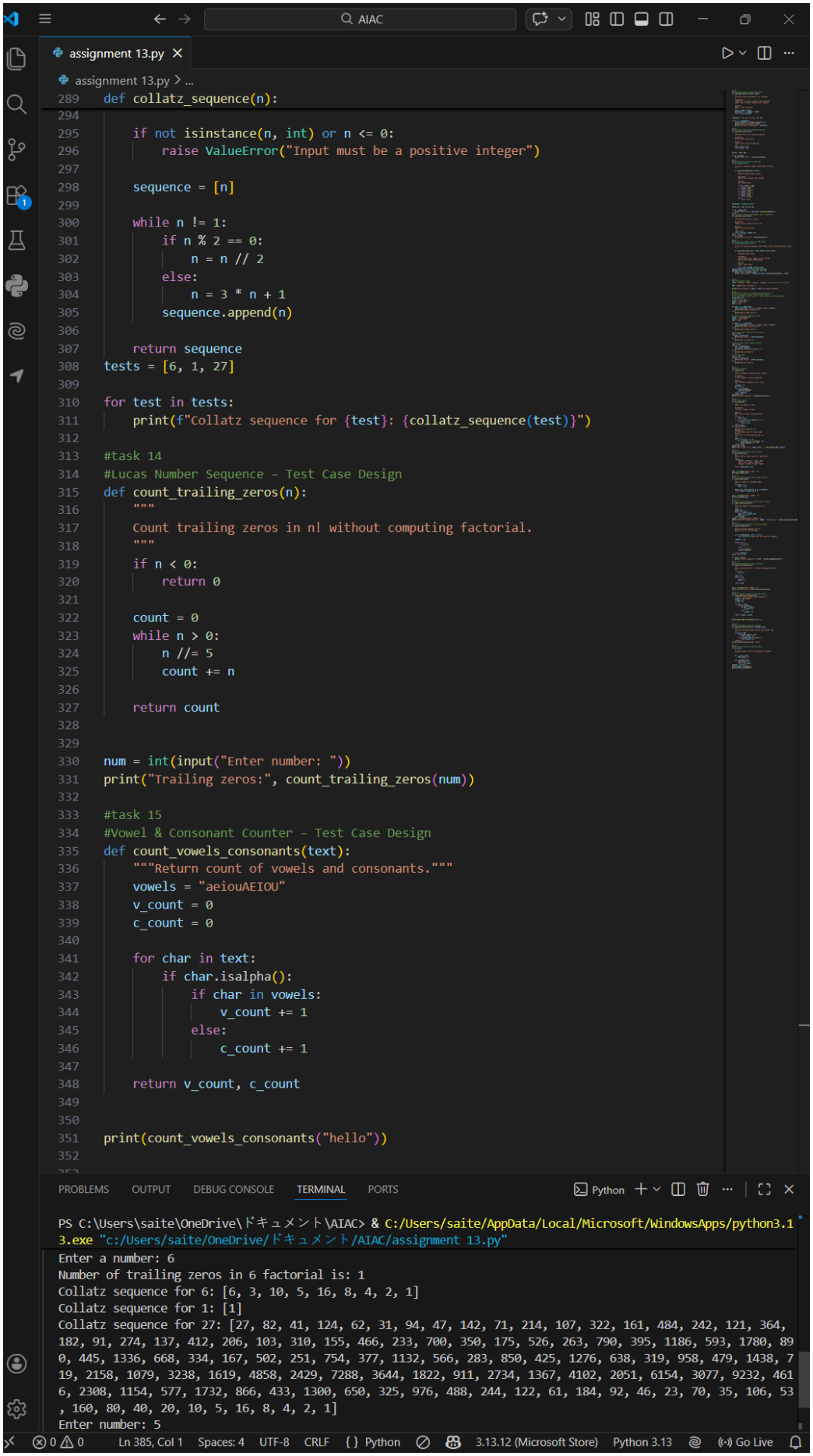

AIAC
assignment 13.py
assignment 13.py > ...
#TASK 1
#Refactoring – Removing Code Duplication
def rectangle_details(length, width):
"""
Calculate area and perimeter of a rectangle.
Parameters:
length (int or float): Length of the rectangle
width (int or float): Width of the rectangle
Returns:
tuple: (area, perimeter)
"""
area = length * width
perimeter = 2 * (length + width)
return area, perimeter
rectangles = [(5, 10), (7, 12), (10, 15)]
for l, w in rectangles:
area, perimeter = rectangle_details(l, w)
print("Area of Rectangle:", area)
print("Perimeter of Rectangle:", perimeter)
#TASK 2
#Refactoring – Extracting Reusable Functions
def calculate_total(price):
"""
Calculate total price including 18% tax.
Parameters:
price (float): Base price
Returns:
float: Total price including tax
"""
tax = price * 0.18
return price + tax
prices = [250, 500]
for p in prices:
print("Total Price:", calculate_total(p))
#task 3
#Refactoring Using Classes and Methods
class GradeCalculator:
"""
A class to calculate student grades based on marks.
"""
def calculate_grade(self, marks):
"""
Determine grade based on marks.
Parameters:
marks (int): Student marks (0–100)
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Python
PS C:\Users\saite\OneDrive\ドキュメント\AIAC> & C:/Users/saite/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/saite/OneDrive/ドキュメント/AIAC/assignment 13.py"
Area of Rectangle: 50
Perimeter of Rectangle: 30
Area of Rectangle: 84
Perimeter of Rectangle: 38
Area of Rectangle: 150
Perimeter of Rectangle: 50
Total Price: 295.0
Total Price: 590.0
Marks: 85 → Grade B
Marks: 72 → Grade C
Marks: 95 → Grade A
Ln 385, Col 1
Spaces: 4
UTF-8
CRLF
Python
3.13.12 (Microsoft Store)
Python 3.13
Go Live


AIAC
assignment 13.py
assignment 13.py > ...
class GradeCalculator:
def calculate_grade(self, marks):
elif marks >= 80:
return "Grade B"
elif marks >= 70:
return "Grade C"
elif marks >= 40:
return "Grade D"
else:
return "Fail"
calculator = GradeCalculator()
marks_list = [85, 72, 95, 35]
for m in marks_list:
print(f"Marks: {m} → {calculator.calculate_grade(m)}")
#TASK 4
#Refactoring – Converting Procedural Code to Functions
def calculate_area(radius):
"""
Calculate the area of a circle.
Parameters:
radius (float): Radius of the circle
Returns:
float: Area of the circle
"""
import math
return math.pi * radius ** 2
radii = [3, 5, 7]
for r in radii:
print("Area of Circle:", calculate_area(r))
#TASK 5
#Refactoring Procedural Code into OOP Design
class Employeesalarycalculator:
"""
A class to calculate employee salary based on hours worked and hourly rate.
"""
def calculate_salary(self, hours_worked, hourly_rate):
"""
Calculate total salary.
Parameters:
hours_worked (int): Number of hours worked
hourly_rate (float): Hourly wage
Returns:
float: Total salary
"""
return hours_worked * hourly_rate
salary_calculator = Employeesalarycalculator()
employee_data = [(40, 15), (35, 20), (45, 18)]
for hours, rate in employee_data:
print("Total Salary:", salary_calculator.calculate_salary(hours, rate))
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Python
PS C:\Users\saite\OneDrive\ドキュメント\AIAC> & C:/Users/saite/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/saite/OneDrive/ドキュメント/AIAC/assignment 13.py"
Area of Rectangle: 50
Perimeter of Rectangle: 30
Area of Rectangle: 84
Perimeter of Rectangle: 38
Area of Rectangle: 150
Perimeter of Rectangle: 50
Total Price: 295.0
Total Price: 590.0
Marks: 85 → Grade B
Marks: 72 → Grade C
Marks: 95 → Grade A
Ln 385, Col 1
Spaces: 4
UTF-8
CRLF
Python
3.13.12 (Microsoft Store)
Python 3.13
Go Live


AIAC
assignment 13.py
assignment 13.py > ...
#task 6
#Optimizing Search Logic
users = {"admin", "guest", "editor", "viewer"} # Using set for O(1) lookup
name = input("Enter username: ")
print("Access Granted" if name in users else "Access Denied")
#task 7
#Refactoring – Using List Comprehensionslibrary_db = {}
# Library Management System (Unstructured Version)
# This code needs refactoring into a proper module with documentation.
library_db = {}
# Adding first book
title = "Python Basics"
author = "John Doe"
isbn = "101"
if isbn not in library_db:
library_db[isbn] = {"title": title, "author": author}
print("Book added successfully.")
else:
print("Book already exists.")
# Adding second book (duplicate logic)
title = "AI Fundamentals"
author = "Jane Smith"
isbn = "102"
if isbn not in library_db:
library_db[isbn] = {"title": title, "author": author}
print("Book added successfully.")
else:
print("Book already exists.")
# Searching book (repeated logic structure)
isbn = "101"
if isbn in library_db:
print("Book Found:", library_db[isbn])
else:
print("Book not found.")
# Removing book (again repeated pattern)
isbn = "101"
if isbn in library_db:
del library_db[isbn]
print("Book removed successfully.")
else:
print("Book not found.")
# Searching again
isbn = "101"
if isbn in library_db:
print("Book Found:", library_db[isbn])
else:
print("Book not found.")
#task 8
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Python
PS C:\Users\saite\OneDrive\ドキュメント\AIAC> & C:/Users/saite/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/saite/OneDrive/ドキュメント/AIAC/assignment 13.py"
Total Salary: 810
Enter username: admin
Access Granted
Book added successfully.
Book added successfully.
Book Found: {'title': 'Python Basics', 'author': 'John Doe'}
Book removed successfully.
Book not found.
Fibonacci Sequence: [0, 1, 1, 2, 3, 5, 8, 13, 21, 34]
Twin Primes up to 100 : [(3, 5), (5, 7), (11, 13), (17, 19), (29, 31), (41, 43), (59, 61), (71, 73)]
Enter a year: 2020
Ln 385, Col 1
Spaces: 4
UTF-8
CRLF
Python
3.13.12 (Microsoft Store)
Python 3.13
Go Live


AIAC
assignment 13.py
assignment 13.py > ...
#task 8
#Fibonacci Generator
def fibonacci(n):
"""
Generate Fibonacci sequence up to n terms.
Parameters:
n (int): Number of terms to generate
Returns:
list: Fibonacci sequence up to n terms
"""
sequence = []
a, b = 0, 1
for _ in range(n):
sequence.append(a)
a, b = b, a + b
return sequence
num_terms = 10
print("Fibonacci Sequence:", fibonacci(num_terms))
#task 9
#Twin Primes Checker
def is_prime(num):
"""
Check if a number is prime.
Parameters:
num (int): Number to check
Returns:
bool: True if prime, False otherwise
"""
if num <= 1:
return False
for i in range(2, int(num**0.5) + 1):
if num % i == 0:
return False
return True
def twin_primes(n):
"""
Generate twin primes up to n.
Parameters:
n (int): Upper limit for twin primes
Returns:
list: List of twin prime pairs up to n
"""
twins = []
for i in range(2, n - 1):
if is_prime(i) and is_prime(i + 2):
twins.append((i, i + 2))
return twins
upper_limit = 100
print("Twin Primes up to", upper_limit, ":", twin_primes(upper_limit))
#task 10
#Refactoring the Chinese Zodiac Program
def get_zodiac(year):
"""
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Python
PS C:\Users\saite\OneDrive\ドキュメント\AIAC> & C:/Users/saite/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/saite/OneDrive/ドキュメント/AIAC/assignment 13.py"
Book removed successfully.
Book not found.
Fibonacci Sequence: [0, 1, 1, 2, 3, 5, 8, 13, 21, 34]
Twin Primes up to 100 : [(3, 5), (5, 7), (11, 13), (17, 19), (29, 31), (41, 43), (59, 61), (71, 73)]
Enter a year: 2020
Rat
Enter a number: 5
True
Enter a number: 6
Number of trailing zeros in 6 factorial is: 1
Collatz sequence for 6: [6, 3, 10, 5, 16, 8, 4, 2, 1]
Ln 385, Col 1
Spaces: 4
UTF-8
CRLF
Python
3.13.12 (Microsoft Store)
Python 3.13
Go Live


AIAC
assignment 13.py
assignment 13.py > ...
#task 10
#Refactoring the Chinese Zodiac Program
def get_zodiac(year):
"""
Return Chinese zodiac sign for a given year.
"""
zodiac = [
"Monkey", "Rooster", "Dog", "Pig",
"Rat", "Ox", "Tiger", "Rabbit",
"Dragon", "Snake", "Horse", "Goat"
]
return zodiac[year % 12]
year = int(input("Enter a year: "))
print(get_zodiac(year))
#task 11
#Refactoring the Harshad (Niven) Number Checker
def is_harshad(number):
"""
Check if number is a Harshad number.
"""
if number <= 0:
return False
digit_sum = sum(int(d) for d in str(number))
return number % digit_sum == 0
num = int(input("Enter a number: "))
print(is_harshad(num))
#task 12
# Refactoring the Factorial Trailing Zeros Program
def count_trailing_zeros(n):
"""
Count the number of trailing zeros in n!.
"""
count = 0
power_of_5 = 5
while n >= power_of_5:
count += n // power_of_5
power_of_5 *= 5
return count
number = int(input("Enter a number: "))
print("Number of trailing zeros in", number, "factorial is:", count_trailing_zeros(num
#task 13
#Collatz Sequence Generator – Test Case Design)
def collatz_sequence(n):
"""
Generate Collatz sequence until 1.
Raises error for invalid input.
"""
if not isinstance(n, int) or n <= 0:
raise ValueError("Input must be a positive integer")
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Python
PS C:\Users\saite\OneDrive\ドキュメント\AIAC> & C:/Users/saite/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/saite/OneDrive/ドキュメント/AIAC/assignment 13.py"
Twin Primes up to 100 : [(3, 5), (5, 7), (11, 13), (17, 19), (29, 31), (41, 43), (59, 61), (71, 73)]
Enter a year: 2020
Rat
Enter a number: 5
True
Enter a number: 6
Number of trailing zeros in 6 factorial is: 1
Collatz sequence for 6: [6, 3, 10, 5, 16, 8, 4, 2, 1]
Collatz sequence for 1: [1]
Collatz sequence for 27: [27, 82, 41, 124, 62, 31, 94, 47, 142, 71, 214, 107, 322, 161, 484, 242, 121, 364, 182, 91, 274, 137, 412, 206, 103, 310, 155, 466, 233, 700, 350, 175, 526, 263, 790, 395, 1186, 593, 1780, 89
Ln 385, Col 1
Spaces: 4
UTF-8
CRLF
Python
3.13.12 (Microsoft Store)
Python 3.13
Go Live


AIAC
assignment 13.py
assignment 13.py > ...
289 def collatz_sequence(n):
294
295 if not isinstance(n, int) or n <= 0:
296 raise ValueError("Input must be a positive integer")
297
298 sequence = [n]
299
300 while n != 1:
301 if n % 2 == 0:
302 n = n // 2
303 else:
304 n = 3 * n + 1
305 sequence.append(n)
306
307 return sequence
308 tests = [6, 1, 27]
309
310 for test in tests:
311 print(f"Collatz sequence for {test}: {collatz_sequence(test)}")
312
313 #task 14
314 #Lucas Number Sequence – Test Case Design
315 def count_trailing_zeros(n):
316 """
317 Count trailing zeros in n! without computing factorial.
318 """
319 if n < 0:
320 return 0
321
322 count = 0
323 while n > 0:
324 n //= 5
325 count += n
326
327 return count
328
329
330 num = int(input("Enter number: "))
331 print("Trailing zeros:", count_trailing_zeros(num))
332
333 #task 15
334 #Vowel & Consonant Counter – Test Case Design
335 def count_vowels_consonants(text):
336 """Return count of vowels and consonants."""
337 vowels = "aeiouAEIOU"
338 v_count = 0
339 c_count = 0
340
341 for char in text:
342 if char.isalpha():
343 if char in vowels:
344 v_count += 1
345 else:
346 c_count += 1
347
348 return v_count, c_count
349
350
351 print(count_vowels_consonants("hello"))
352
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Python
PS C:\Users\saite\OneDrive\ドキュメント\AIAC> & C:/Users/saite/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/saite/OneDrive/ドキュメント/AIAC/assignment 13.py"
Enter a number: 6
Number of trailing zeros in 6 factorial is: 1
Collatz sequence for 6: [6, 3, 10, 5, 16, 8, 4, 2, 1]
Collatz sequence for 1: [1]
Collatz sequence for 27: [27, 82, 41, 124, 62, 31, 94, 47, 142, 71, 214, 107, 322, 161, 484, 242, 121, 364, 182, 91, 274, 137, 412, 206, 103, 310, 155, 466, 233, 700, 350, 175, 526, 263, 790, 395, 1186, 593, 1780, 890, 445, 1336, 668, 334, 167, 502, 251, 754, 377, 1132, 566, 283, 850, 425, 1276, 638, 319, 958, 479, 1438, 719, 2158, 1079, 3238, 1619, 4858, 2429, 7288, 3644, 1822, 911, 2734, 1367, 4102, 2051, 6154, 3077, 9232, 4616, 2308, 1154, 577, 1732, 866, 433, 1300, 650, 325, 976, 488, 244, 122, 61, 184, 92, 46, 23, 70, 35, 106, 53, 160, 80, 40, 20, 10, 5, 16, 8, 4, 2, 1]
Enter number: 5
Ln 385, Col 1
Spaces: 4
UTF-8
CRLF
{ } Python
3.13.12 (Microsoft Store)
Python 3.13
Go Live