AI ASSISTED CODING

Hall Ticket No: 2303A510B4

Batch:14

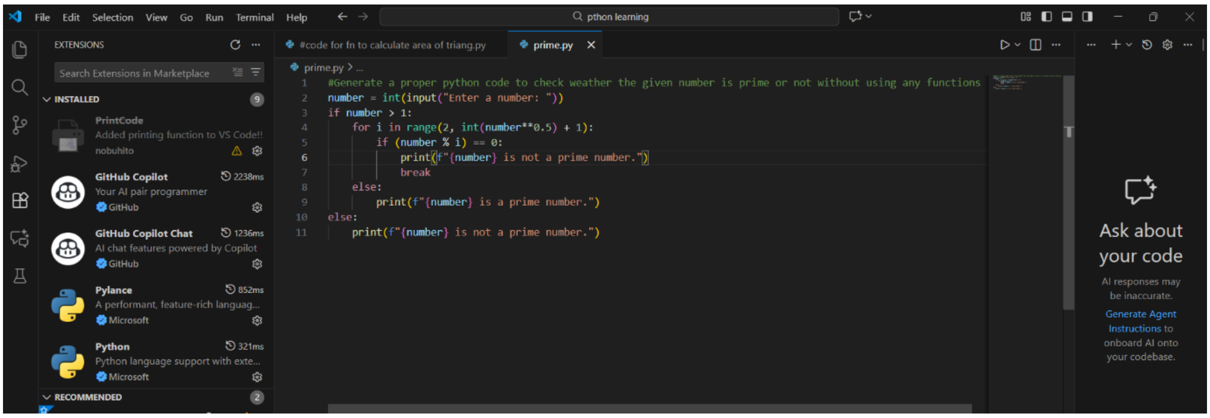
Assignment-1.4

Task-1. AI-Generated Logic Without Modularization (Prime Number Check Without Functions)

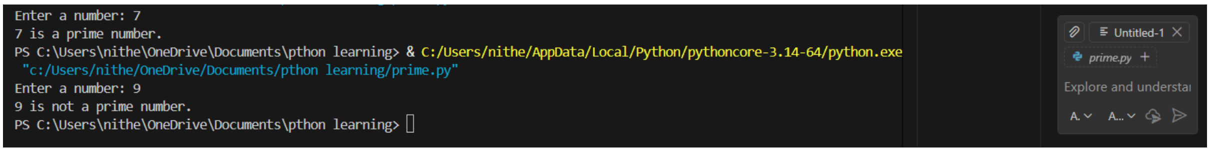
Prompt

#Generate a proper python code to check weather the given number is prime or not without using any functions

Code



Output:



Justification:

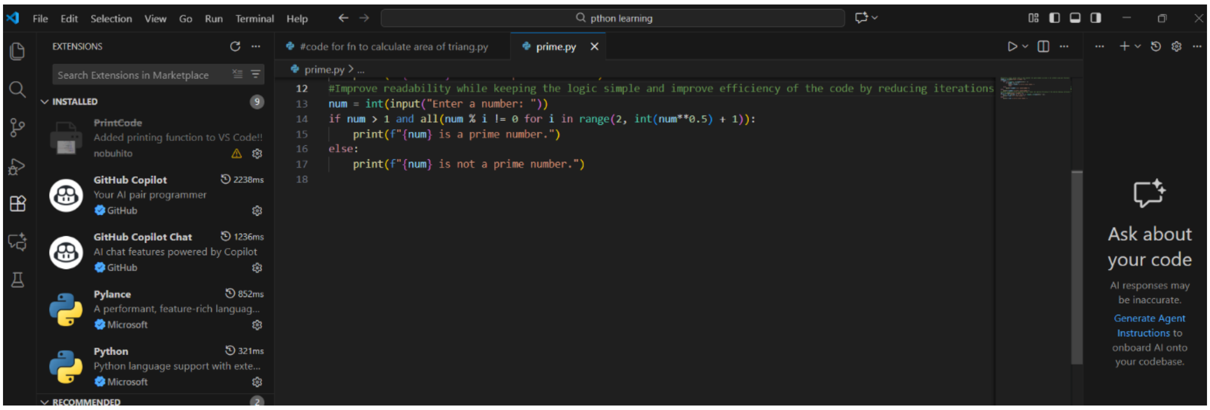
This program checks whether a given number is prime using direct conditional logic without defining any functions.
All computations are performed sequentially in a single block, making the logic easy to follow and suitable for beginners.

Task-2. Efficiency & Logic Optimization (Cleanup)

Prompt

#Improve readability while keeping the logic simple and improve efficiency of the code by reducing iterations also minimize the code length

Code:



Output:

```
Enter a number: 579
579 is not a prime number.
Enter a number: 1236
1236 is not a prime number.
PS C:\Users\nithe\OneDrive\Documents\pthon learning>
```

Justification:

The optimized script improves performance by reducing unnecessary iterations and limiting the loop range, enabling faster execution for larger input values.
Early termination and simplified conditions lower the overall time complexity while maintaining correct prime number validation.

Task-3. Modular Design Using AI Assistance (Prime Number Check Using Functions)

Prompt:

#The function must return a Boolean value (True if prime, False otherwise)

```python
#Write a Python program using a user-defined function to check whether a given number is prime and return the result as a Boole

def is_prime(num):
    if num <= 1:
        return False
    for i in range(2, int(num**0.5) + 1):
        if num % i == 0:
            return False
    return True
# Example usage
number = int(input("Enter a number: "))
if is_prime(number):
    print(f"{number} is a prime number.")
else:
    print(f"{number} is not a prime number.")
#gave code in boolean value
result = is_prime(number)
print("Boolean result:", result)
```

Output:

```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS
PS C:\Users\meteb\OneDrive\Desktop\python> & C:/Users/meteb/AppData/Local/Microsoft/WindowsApps/python3.13.exe c:/Users/meteb/OneDrive/Desktop/python/Un
led-2.py
Enter a number: 571
571 is a prime number.
Boolean result: True
PS C:\Users\meteb\OneDrive\Desktop\python> & C:/Users/meteb/AppData/Local/Microsoft/WindowsApps/python3.13.exe c:/Users/meteb/OneDrive/Desktop/python/Un
led-2.py
Enter a number: 588
```

Justification:

Using a user-defined function makes the prime-checking logic reusable across multiple modules, improving code modularity and maintainability. Returning a Boolean value enables easy integration with conditional statements and other program components.

Task-4: Comparative Analysis –With vs Without Functions

Prompt:

 # Compare both code with function without function Analyze and compare two Python programs for checking whether a number is prime

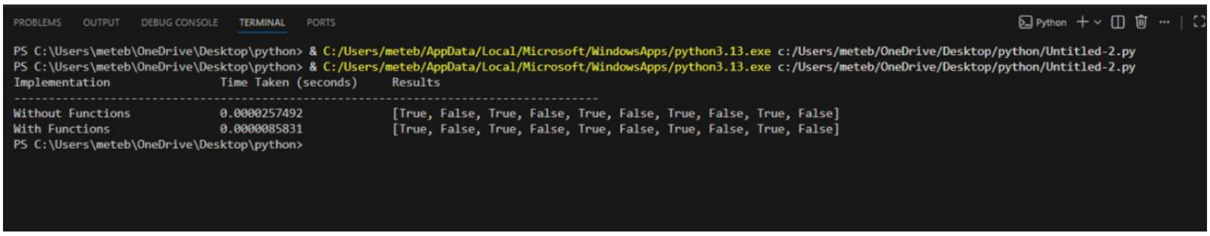
Code:

```python
#Compare prime-checking programs written with and without functions and present the analysis in a comparison table
import time
# Prime-checking program without functions
def is_prime_no_function(n):
    if n <= 1:
        return False
    for i in range(2, int(n**0.5) + 1):
        if n % i == 0:
            return False
    return True
# Prime-checking program with functions
def is_prime_with_function(n):
    if n <= 1:
        return False
    for i in range(2, int(n**0.5) + 1):
        if n % i == 0:
            return False
    return True
# Performance comparison
def performance_comparison():
    test_numbers = [29, 15, 97, 100, 37, 49, 83, 121, 53, 64]

    # Measure time for no function version
    start_no_func = time.time()
    results_no_func = [is_prime_no_function(num) for num in test_numbers]
    end_no_func = time.time()
    time_no_func = end_no_func - start_no_func

    # Measure time for function version
    start_with_func = time.time()
```

Output:



Justification:

Programs written with functions offer better code clarity by separating logic into well-defined blocks, making them easier to read and understand. Function-based designs improve reusability and debugging ease, as changes or fixes can be applied in one place without affecting the entire code.

Task-5: AI-Generated Iterative vs Recursive Fibonacci Approaches (Different Algorithmic Approaches to Prime Checking)

Prompt: Prime Number Check – Basic vs Optimized Approach

Code:

```python
#A basic divisibility check approach that tests all possible divisors sequentially
# Implementation 2: Optimized approach
def is_prime_optimized(n):
    """Check if a number is prime using an optimized approach."""
    if n <= 1:
        return False
    if n <= 3:
        return True
    if n % 2 == 0 or n % 3 == 0:
        return False
    i = 5
    while i * i <= n:
        if n % i == 0 or n % (i + 2) == 0:
            return False
        i += 6
    return True
#Prime Number Check - Basic vs Optimized Approach
#An optimized method that reduces the number of checks by eliminating even numbers and testing up to the squa
# Example usage
if __name__ == "__main__":
    test_numbers = [1, 2, 3, 4, 5, 16, 17, 18, 19, 20]
    for number in test_numbers:
        print(f"Basic: Is {number} prime? {is_prime_basic(number)}")
        print(f"Optimized: Is {number} prime? {is_prime_optimized(number)}")
```

Output:

```
Basic: Is 1 prime? False
Optimized: Is 1 prime? False
Basic: Is 2 prime? True
Optimized: Is 2 prime? True
Basic: Is 3 prime? True
Optimized: Is 3 prime? True
Basic: Is 4 prime? False
Optimized: Is 4 prime? False
Basic: Is 5 prime? True
Optimized: Is 5 prime? True
Basic: Is 16 prime? False
Optimized: Is 5 prime? True
Basic: Is 16 prime? False
Basic: Is 16 prime? False
Optimized: Is 16 prime? False
Basic: Is 17 prime? True
Optimized: Is 17 prime? True
Basic: Is 18 prime? False
Optimized: Is 18 prime? False
Basic: Is 17 prime? True
Optimized: Is 17 prime? True
Basic: Is 18 prime? False
Optimized: Is 18 prime? False
Basic: Is 18 prime? False
Optimized: Is 18 prime? False
Optimized: Is 18 prime? False
Basic: Is 19 prime? True
Optimized: Is 19 prime? True
```

Justification:

The basic approach checks divisibility up to N−1, resulting in unnecessary iterations and higher time complexity.

The optimized approach checks only up to $\sqrt{N}$ because any factor larger than $\sqrt{N}$ must have a corresponding smaller factor.