ASSIGNMENT-10.1

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Task Description #1 – Syntax and Logic Errors

Task: Use AI to identify and fix syntax and logic errors in a faulty

Python script.

Sample Input Code:

 # Calculate average score of a student

def calc_average(marks):

total = 0

for m in marks:

total += m

average = total / len(marks)

return avrage # Typo here

marks = [85, 90, 78, 92]

print("Average Score is ", calc_average(marks)

Expected Output:

• Corrected and runnable Python code with explanations of the

fixes.

```python
# refactored code with a typo and a missing paranthesis

def calc_average(marks):
    total = 0
    for m in marks:
        total += m
    average = total / len(marks)
    return average # Fixed typo : 'avrage' to 'average' and added missing paranthesis
marks = [85, 90, 78, 92]
print("Average Score is ", calc_average(marks))
```

```
Average Score is  86.25
```


```
Average Score is  86.25
```

Task Description #2 – PEP 8 Compliance

Task: Use AI to refactor Python code to follow PEP 8 style

guidelines.

Sample Input Code:

def area_of_rect(L,B) : return L*B

print(area_of_rect(10,20))

Expected Output:

• Well-formatted PEP 8-compliant Python code.

```python
def area_of_rect(L,B) : return L*B
print(area_of_rect(10,20))
#refactored the above code and add documentation and type hints
def area_of_rect(length: float, breadth: float) -> float:
    """
    Calculate the area of a rectangle given its length and breadth.

    Parameters:
    length (float): The length of the rectangle.
    breadth (float): The breadth of the rectangle.

    Returns:
    float: The area of the rectangle calculated as length multiplied by breadth.
    Raises:
    ValueError: If length or breadth is negative, as dimensions cannot be negative.
    TypeError: If length or breadth is not a number (int or float).
    """
    if not isinstance(length, (int, float)) or not isinstance(breadth, (int, float)):
        raise TypeError("Length and breadth must be numbers (int or float).")
    if length < 0 or breadth < 0:
        raise ValueError("Length and breadth must be non-negative.")
    return length * breadth
print(area_of_rect(10, 20))
```

```
200
200
```

Task Description #3 – Readability Enhancement

Task: Use AI to make code more readable without changing its

logic.

Sample Input Code:

def c(x,y):

return x*y/100

a=200

b=15

print(c(a,b))

Expected Output:

• Python code with descriptive variable names, inline

comments, and clear formatting.

```python
def c(x,y):
    return x*y/100
a=200
b=15
print(c(a,b))
#refactored the above code with descriptive variable names, inline comments, and clear formatting
def calculate_percentage(part: float, whole: float) -> float:
    """
    Calculate the percentage of a part relative to a whole.

    Parameters:
    part (float): The portion or part value.
    whole (float): The total or whole value.

    Returns:
    float: The percentage calculated as (part / whole) * 100.
    Raises:
    ValueError: If the whole is zero, as division by zero is not allowed.
    TypeError: If part or whole is not a number (int or float).
    """
    if not isinstance(part, (int, float)) or not isinstance(whole, (int, float)):
        raise TypeError("Both part and whole must be numbers (int or float).")
    if whole == 0:
        raise ValueError("Whole cannot be zero to avoid division by zero.")
    return (part / whole) * 100
```

```
_file.py"
30.0
```

Task Description #4 – Refactoring for Maintainability

Task: Use AI to break repetitive or long code into reusable

functions.

Sample Input Code:

students = ["Alice", "Bob", "Charlie"]

print("Welcome", students[0])

print("Welcome", students[1])

print("Welcome", students[2])

Expected Output:

- **Modular code with reusable functions.**

```python
students = ["Alice", "Bob", "Charlie"]
print("Welcome", students[0])
print("Welcome", students[1])
print("Welcome", students[2])
#refactored code to reduce redundancy with reusable function
def welcome_student(student: str) -> None:
    """
    Print a welcome message for a student.

    Parameters:
    student (str): The name of the student to welcome.

    Returns:
    None
    values:
    student: A string representing the name of the student.
    type error: If the input is not a string, a TypeError will be raised.

    """
    if not isinstance(student, str):
        raise TypeError("Student name must be a string.")
    print("Welcome", student)
```

```
ent.py"
Welcome Alice
Welcome Bob
Welcome Charlie
```

Task Description #5 – Performance Optimization

Task: Use AI to make the code run faster.

Sample Input Code:

 # Find squares of numbers

nums = [i for i in range(1,1000000)]

squares = []

for n in nums:

squares.append(n2)**

print(len(squares))

Expected Output:

• Optimized code using list comprehensions or vectorized

operations.

```python
nums = [i for i in range(1,1000000)]
squares = []
for n in nums:
    squares.append(n**2)
print(len(squares))
#refoctored the above code to reduce time complexity
nums = [i for i in range(1,1000000)]
squares = [n**2 for n in nums]
print(len(squares))
```

```
999999
999999
```

```python
import time
time1 = time.time()
nums = [i for i in range(1,1000000)]
squares = []
for n in nums:
    squares.append(n**2)
#print(len(squares))
time2 = time.time()
print("Time taken:", time2 - time1)
# refactor the above code to reduce time complexity
time3 = time.time()
nums = [i for i in range(1,1000000)]
squares = [n**2 for n in nums]
#print(len(squares))
time4=time.time()
print("Time taken:", time4 - time3)
time5 = time.time()
#print(len([n**2 for n in range(1,1000000)]))
time6 = time.time()
print("Time taken:", time6 - time5)
```

```
Time taken: 0.36050939559936523
Time taken: 0.3215620517730713
Time taken: 9.5367431640625e-07
```

Task Description #6 – Complexity Reduction

Task: Use AI to simplify overly complex logic.

Sample Input Code:

```
def grade(score):
if score >= 90:
return "A"
else:
if score >= 80:
return "B"
else:
if score >= 70:
return "C"
else:
if score >= 60:
return "D"
else:
return "F"
```

Expected Output:

- **Cleaner logic using elif or dictionary mapping.**

```python
def grade(score):
    if score >= 90:
        return "A"
    else:
        if score >= 80:
            return "B"
        else:
            if score >= 70:
                return "C"
            else:
                if score >= 60:
                    return "D"
                else:
                    return "F"
#refactored code to Cleaner logic using elif or dictionary mapping.
def grade(score: int) -> str:
    """
    Return the grade based on the score.
    Parameters:
    score (int): Student score
    Returns:
    str: Grade (A, B, C, D, or F)
    """
    if score >= 90:
        return "A"
    elif score >= 80:
        return "B"
    elif score >= 70:
        return "C"
    elif score >= 60:
        return "D"
    else:
        return "F"
print (grade(95))
def grade(score: int) -> str:
    """
    Return the grade based on the score using dictionary mapping.
    """
    grade_map = {
        90: "A",
        80: "B",
        70: "C",
        60: "D",
        0: "F"
    }
    for cutoff, letter in grade_map.items():
        if score >= cutoff:
            return letter
print (grade(85))

```

```
uments/AI Lab/grade.py"
A
B
```