AI ASSISTED CODING

ASSIGNMENT-10.5

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Task Description #1 – Variable Naming Issues

Task: Use AI to improve unclear variable names.

Sample Input Code:

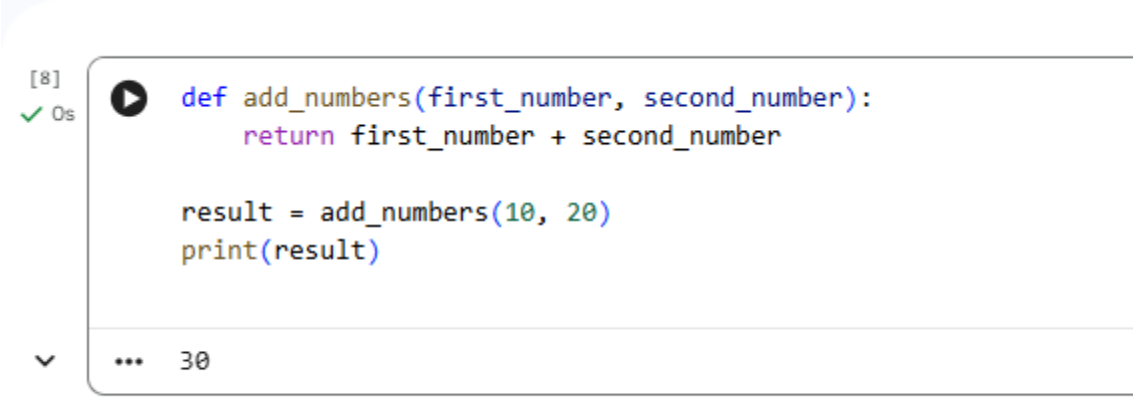
def f(a, b):

return a + b

print(f(10, 20))

Expected Output:

• Code rewritten with meaningful function and variable names.



Task Description #2 – Missing Error Handling

Task: Use AI to add proper error handling.

Sample Input Code:

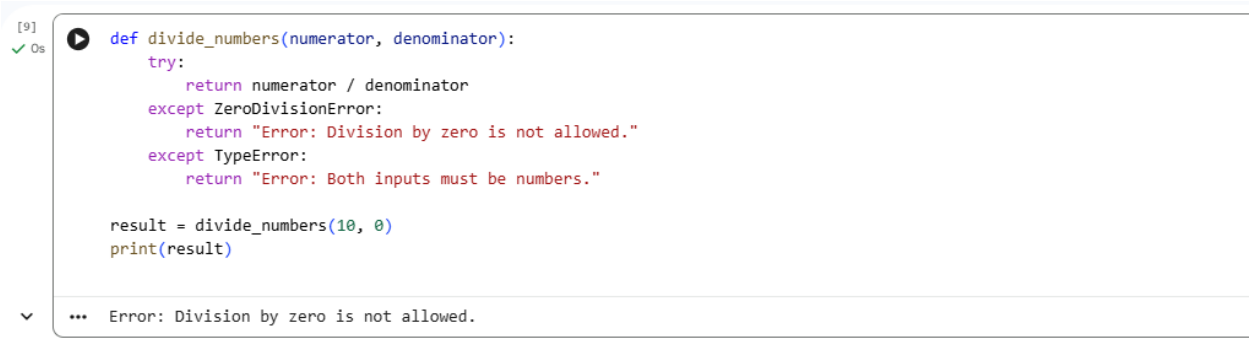
def divide(a, b):

return a / b

print(divide(10, 0))

Expected Output:

• Code with exception handling and clear error messages



Task Description #3: Student Marks Processing System

The following program calculates total, average, and grade of a

student, but it has poor readability, style issues, and no error

handling.

marks=[78,85,90,66,88]

t=0

for i in marks:

t=t+i

a=t/len(marks)

if a>=90:

print("A")

elif a>=75:

print("B")

elif a>=60:

print("C")

else:

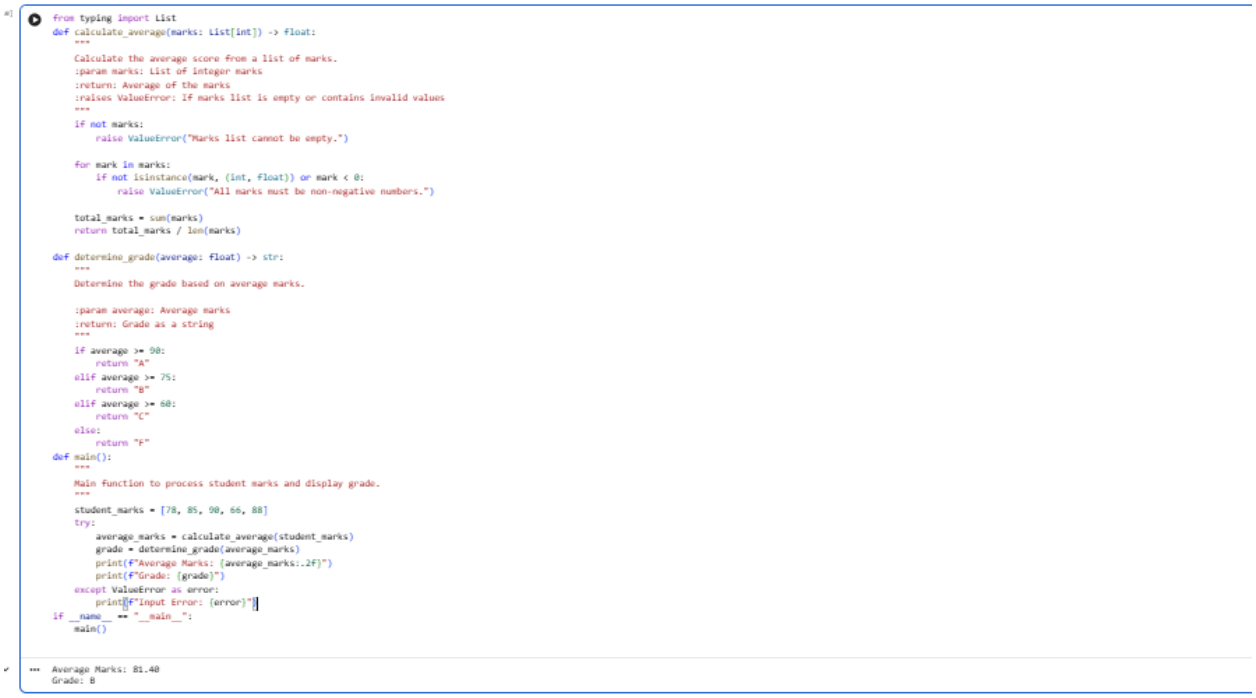
print("F")

Task:

• Use AI to refactor the code to follow PEP 8 standards.

• Add meaningful variable names, functions, and comments.

• Add basic input validation and documentation.



```
from typing import List
def calculate_average(marks: List[int]) -> float:
    """
    Calculate the average score from a list of marks.
    :param marks: List of integer marks
    :return: Average of the marks
    :raises ValueError: If marks list is empty or contains invalid values
    """
    if not marks:
        raise ValueError("Marks list cannot be empty.")

    for mark in marks:
        if not isinstance(mark, (int, float)) or mark < 0:
            raise ValueError("All marks must be non-negative numbers.")

    total_marks = sum(marks)
    return total_marks / len(marks)

def determine_grade(average: float) -> str:
    """
    Determine the grade based on average marks.

    :param average: Average marks
    :return: Grade as a string
    """
    if average >= 90:
        return "A"
    elif average >= 75:
        return "B"
    elif average >= 60:
        return "C"
    else:
        return "F"
def main():
    """
    Main function to process student marks and display grade.
    """
    student_marks = [78, 85, 90, 66, 88]
    try:
        average_marks = calculate_average(student_marks)
        grade = determine_grade(average_marks)
        print(f"Average Marks: {average_marks:.2f}")
        print(f"Grade: {grade}")
    except ValueError as error:
        print(f"Input Error: {error}")
if __name__ == "__main__":
    main()
```

```
Average Marks: 81.40
Grade: B
```

Task Description #4: Use AI to add docstrings and inline comments

to the following function.

def factorial(n):

result = 1

for i in range(1,n+1):

result *= i

return result

```python
def factorial(n):
    """
    Calculate the factorial of a non-negative integer.

    :param n: A non-negative integer
    :return: Factorial of n
    :raises ValueError: If n is negative
    :raises TypeError: If n is not an integer
    """
    if not isinstance(n, int):
        raise TypeError("Input must be an integer.")

    if n < 0:
        raise ValueError("Input must be a non-negative integer.")

    result = 1
    for i in range(1, n + 1):
        result *= i

    return result


print(factorial(5))
```

```
120
```

Task Description #5: Password Validation System (Enhanced)

The following Python program validates a password using only a minimum length check, which is insufficient for real-world security requirements.

pwd = input("Enter password: ")

if len(pwd) >= 8:

print("Strong")

else:

print("Weak")

Task:

1. Enhance password validation using AI assistance to include multiple security rules such as:

o Minimum length requirement

o Presence of at least one uppercase letter

o Presence of at least one lowercase letter

o Presence of at least one digit

o Presence of at least one special character

2. Refactor the program to:

o Use meaningful variable and function names

o Follow PEP 8 coding standards

o Include inline comments and a docstring

3. Analyze the improvements by comparing the original and AI-enhanced versions in terms of:

o Code readability and structure

o Maintainability and reusability

o Security strength and robustness

4. Justify the AI-generated changes, explaining why each added rule and refactoring decision improves the overall quality of the program.

```python
import re
def is_strong_password(password: str) -> bool:
    """
    Validate a password against common security rules.
    Rules:
    - Minimum length of 8 characters
    - At least one uppercase letter
    - At least one lowercase letter
    - At least one digit
    - At least one special character
    :param password: Password string entered by the user
    :return: True if password meets all rules, otherwise False
    """
    if len(password) < 8:
        return False
    if not re.search(r"[A-Z]", password):
        return False
    if not re.search(r"[a-z]", password):
        return False
    if not re.search(r"\d", password):
        return False
    if not re.search(r"[!@#$%^&*(),.?\":{}|<>]", password):
        return False
    return True
def main():
    """
    Accept user input and display password strength result.
    """
    user_password = input("Enter password: ")
    if is_strong_password(user_password):
        print("Strong password")
    else:
        print("Weak password")
if __name__ == "__main__":
    main()
```

```
Enter password: AI
Weak password
```