# AI ASSISTED CODING LAB 10 CODE AND REVIEW AND QUALITY: USING AI TO IMPROVE CODE AND READABILITY

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**Batch-04**

## TASK 1 — Variable Naming Issues
## PROBLEM

Unclear variable and function names reduce readability and maintainability.

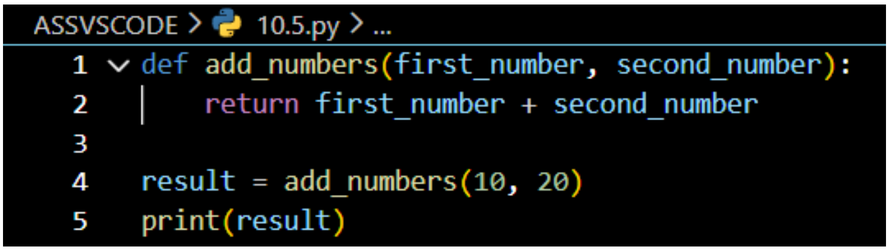
## Question

Improve unclear variable names in the given code.

## Prompt

Refactor the Python function to use meaningful function and variable names following PEP 8 standards.

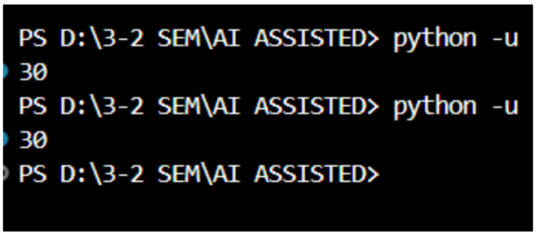
## Code



```
def add_numbers(first_number, second_number):
    return first_number + second_number

result = add_numbers(10, 20)
print(result)
```

```
def add_numbers(first_number, second_number):

    return first_number + second_number

result = add_numbers(10, 20)

print(result)
```

## Output



```
PS D:\3-2 SEM\AI ASSISTED> python -u
30
PS D:\3-2 SEM\AI ASSISTED> python -u
30
PS D:\3-2 SEM\AI ASSISTED>
```

## Explanation

Function name changed from f → add_numbers for clarity.

Variables a and b renamed to first_number and second_number.

Added docstring to explain function purpose.

Improves readability and maintainability.

# TASK 2 — Missing Error Handling

## Problem

Division by zero causes runtime errors due to missing exception handling.

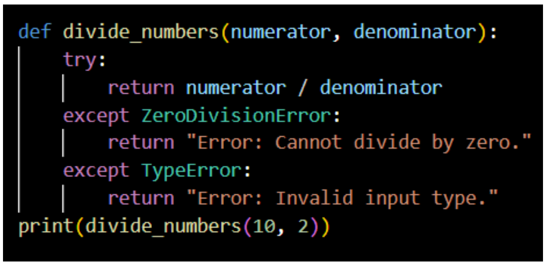
## Question

Add proper error handling to division function.

## Prompt

Modify the function to handle division errors using try-except and display clear messages.

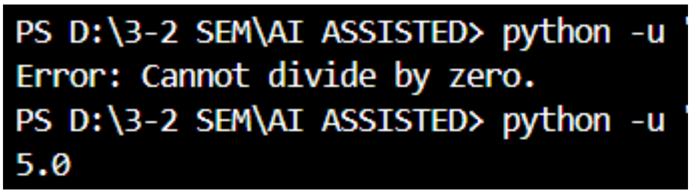
## Code



```
def divide_numbers(numerator, denominator):
    try:
        return numerator / denominator
    except ZeroDivisionError:
        return "Error: Cannot divide by zero."
    except TypeError:
        return "Error: Invalid input type."
print(divide_numbers(10, 2))
```

```
def divide_numbers(numerator, denominator):

    try:

        return numerator / denominator

    except ZeroDivisionError:

        return "Error: Cannot divide by zero."

    except TypeError:
        return "Error: Invalid input type."

print(divide_numbers(10, 2))
```

## Output



```
PS D:\3-2 SEM\AI ASSISTED> python -u
Error: Cannot divide by zero.
PS D:\3-2 SEM\AI ASSISTED> python -u
5.0
```

Before I gave the value zero so it thrown a result of cannot divide by zero

And next I have kept 2 and immediately we got the output and result of 5.0

## Explanation

- Added try-except block.
- Handles ZeroDivisionError and TypeError.
- Prevents program crash.
- Provides user-friendly error message.

## TASK 3 — Student Marks Processing System

## Problem

Poor readability, no functions, no validation, not following PEP 8.

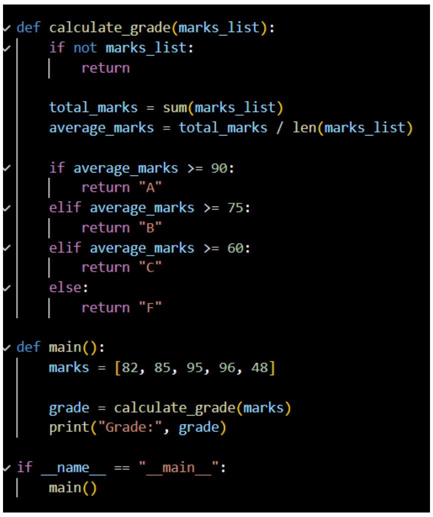
## Question

Refactor code with meaningful names, functions, validation, and comments.

## Prompt

Rewrite program following PEP 8 with functions, comments, and input validation.

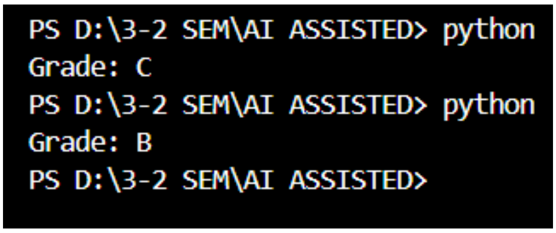
# Code



```
def calculate_grade(marks_list):
    if not marks_list:
        return

    total_marks = sum(marks_list)
    average_marks = total_marks / len(marks_list)

    if average_marks >= 90:
        return "A"
    elif average_marks >= 75:
        return "B"
    elif average_marks >= 60:
        return "C"
    else:
        return "F"

def main():
    marks = [82, 85, 95, 96, 48]

    grade = calculate_grade(marks)
    print("Grade:", grade)

if __name__ == "__main__":
    main()
```

```
def calculate_grade(marks_list):
    if not marks_list:
        return
    total_marks = sum(marks_list)
    average_marks = total_marks / len(marks_list)
    if average_marks >= 90:
        return "A"
    elif average_marks >= 75:
        return "B"
    elif average_marks >= 60:
        return "C"
    else:
        return "F"
def main():
    marks = [82, 85, 95, 96, 48]
    grade = calculate_grade(marks)
    print("Grade:", grade)
if _name___== "_main_":
    main()
```

# Output



```
PS D:\3-2 SEM\AI ASSISTED> python
Grade: C
PS D:\3-2 SEM\AI ASSISTED> python
Grade: B
PS D:\3-2 SEM\AI ASSISTED>
```

**We get our grades according to our marks**

## Explanation

- Used functions for modularity.
- Used built-in sum() for efficiency.
- Added validation for empty list.
- Added docstrings and meaningful names.
- Follows PEP 8 formatting.

## TASK 4 — Add Docstrings and Comments Problem

Function lacks documentation and comments.

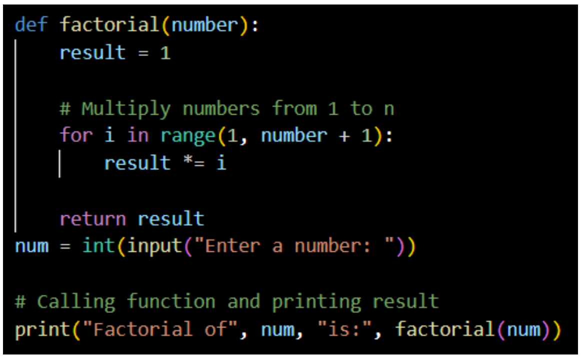
## Question

Add docstrings and inline comments.

## Prompt

Enhance function by adding docstring explaining parameters and logic.

## Code



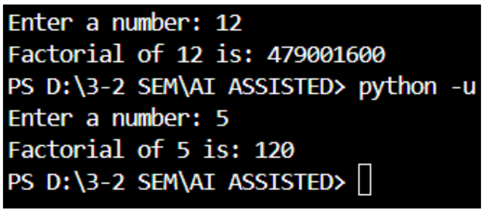
```python
def factorial(number):
    result = 1

    # Multiply numbers from 1 to n
    for i in range(1, number + 1):
        result *= i

    return result
num = int(input("Enter a number: "))

# Calling function and printing result
print("Factorial of", num, "is:", factorial(num))
```

def factorial(number):

    result = 1

```
    # Multiply numbers from 1 to n

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

        result *= i

    return result

num = int(input("Enter a number: "))

# Calling function and printing result

print("Factorial of", num, "is:", factorial(num))
```

## Output



```
Enter a number: 12
Factorial of 12 is: 479001600
PS D:\3-2 SEM\AI ASSISTED> python -u
Enter a number: 5
Factorial of 5 is: 120
PS D:\3-2 SEM\AI ASSISTED>
```

## Explanation

- Added detailed docstring with parameters and return type.
- Added inline comment explaining loop logic.
- Improves documentation and usability.

# TASK 5 — Enhanced Password Validation

## Problem

**Password validation checks only length → weak security.**

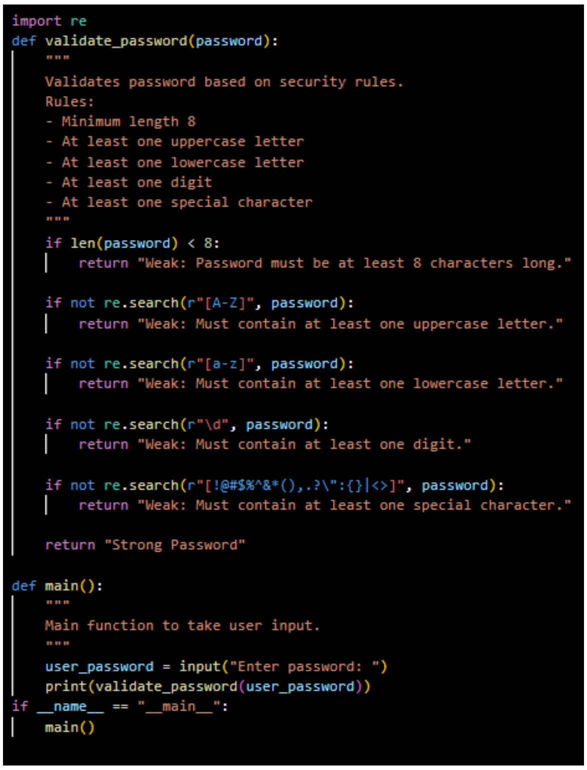
## Question

**Enhance validation with multiple security rules and analysis.**

## Prompt

**Create a password validation system with multiple rules, comments, docstring, and PEP 8 compliance.**

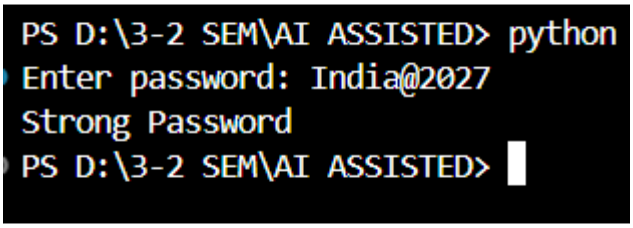
## Code



```
import re
def validate_password(password):
    """
    Validates password based on security rules.
    Rules:
    - Minimum length 8
    - At least one uppercase letter
    - At least one lowercase letter
    - At least one digit
    - At least one special character
    """
    if len(password) < 8:
        return "Weak: Password must be at least 8 characters long."

    if not re.search(r"[A-Z]", password):
        return "Weak: Must contain at least one uppercase letter."

    if not re.search(r"[a-z]", password):
        return "Weak: Must contain at least one lowercase letter."

    if not re.search(r"\d", password):
        return "Weak: Must contain at least one digit."

    if not re.search(r"[!@#$%^&*(),.?\":{}|<>]", password):
        return "Weak: Must contain at least one special character."

    return "Strong Password"

def main():
    """
    Main function to take user input.
    """
    user_password = input("Enter password: ")
    print(validate_password(user_password))
if __name__ == "__main__":
    main()
```

```
import re

def validate_password(password):
    """
    Validates password based on security rules.
    Rules:
    - Minimum length 8
    - At least one uppercase letter
    - At least one lowercase letter
    - At least one digit
    - At least one special character
    """
    if len(password) < 8:
        return "Weak: Password must be at least 8 characters long."

    if not re.search(r"[A-Z]", password):
        return "Weak: Must contain at least one uppercase letter."

    if not re.search(r"[a-z]", password):
        return "Weak: Must contain at least one lowercase letter."

    if not re.search(r"\d", password):
        return "Weak: Must contain at least one digit."

    if not re.search(r"[!@#$%^&*(),.?\":{}|<>]", password):
        return "Weak: Must contain at least one special character."

    return "Strong Password"


def main():
    """
    Main function to take user input.
    """
    user_password = input("Enter password: ")
    print(validate_password(user_password))


if _name__== "_main_": main()
```

# Output



```
PS D:\3-2 SEM\AI ASSISTED> python
Enter password: India@2027
Strong Password
PS D:\3-2 SEM\AI ASSISTED>
```

# Explanation

**Readability Improvements**

- **Meaningful function names.**
- **Structured logic.**
- **Clean formatting.**

**Maintainability**

- **Modular function design.**
- **Easy to modify rules.**

**Security Improvements Added**

**checks for:**

- **Uppercase → prevents simple passwords**
- **Lowercase → improves complexity**
- **Digit → increases entropy**
- **Special character → prevents brute force**
- **Length → baseline security**

# Justification

**Each rule increases password entropy and reduces vulnerability to brute-force and dictionary attacks.**

**Refactoring improves scalability and professional coding standards.**