

# AI ASSISTED CODING

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

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BATCH 04

20<sup>TH</sup> FEB 2026

### 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

```
ASSVSCODE > 10.5.py > ...
1  def add_numbers(first_number, second_number):
2      |   return first_number + second_number
3
4      result = add_numbers(10, 20)
5      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
```

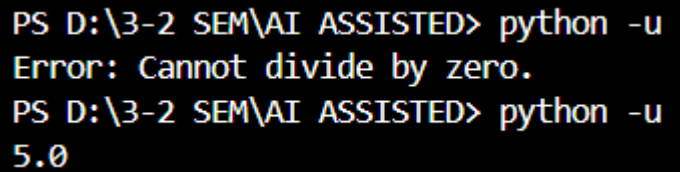
```
    except ZeroDivisionError:
```

```
        return "Error: Cannot divide by zero."
```

```
    except TypeError:
```

```
        return "Error: Invalid input type."
print(divide_numbers(10, 2))
```

## Output

A terminal window with a black background and yellow text. It shows two commands being executed. The first command is 'python -u' followed by a line of code that causes a 'ZeroDivisionError: division by zero'. The second command is 'python -u' followed by a line of code that outputs '5.0'.

```
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

```
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

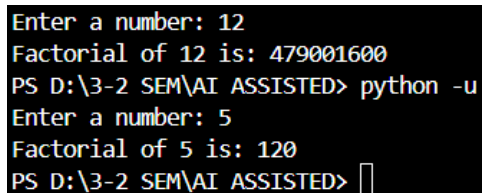
return result

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():

"""

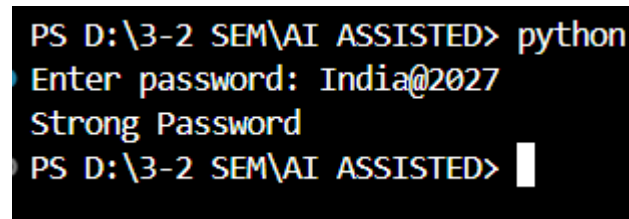
**Main function to take user input.**

```
"""
```

```
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.