Set 1

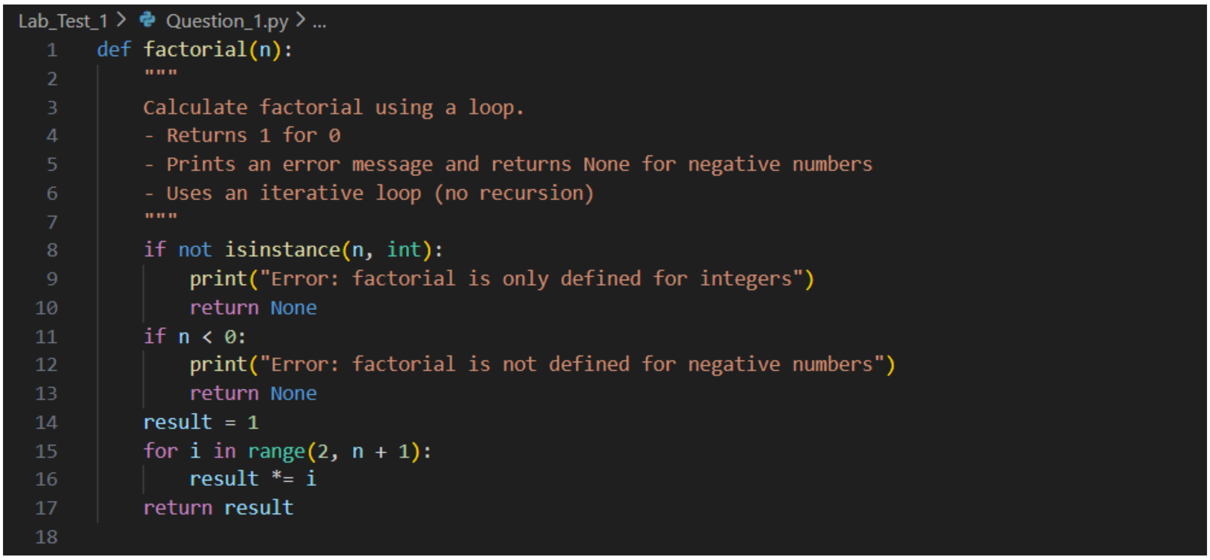
1. Q1. Write a Python function to calculate the factorial of a number. Use a coding assistant and document how you refine your prompt to ensure the function handles negative input and zeros.

(Each question carries 5 marks)

Prompt :

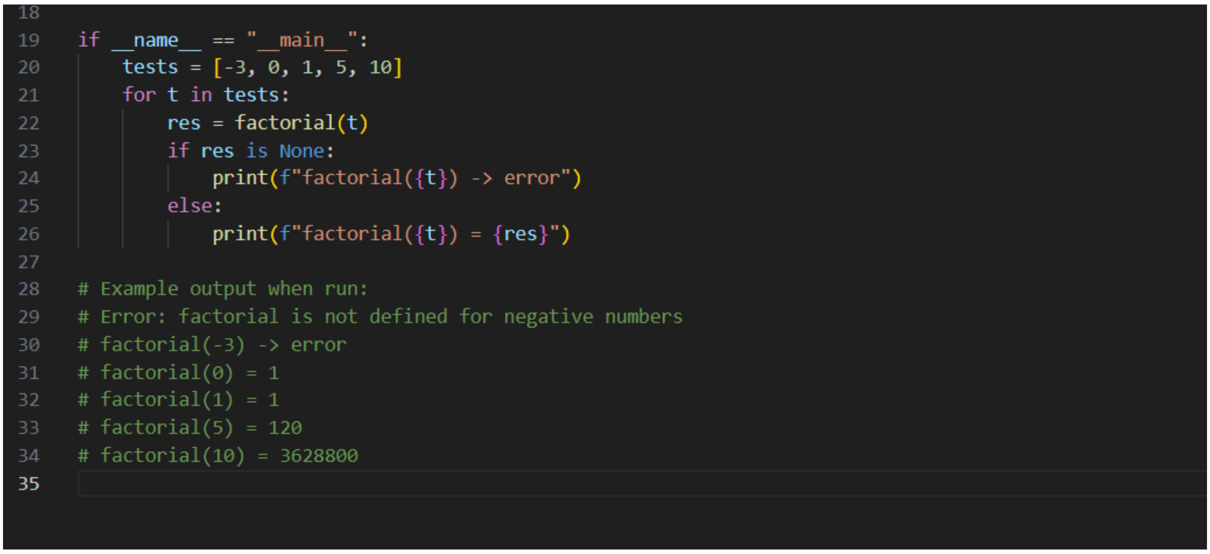
Write a Python program to calculate the factorial of a number using a loop.
Return 1 for zero, show an error for negative numbers, and test it with -3, 0, 1, 5, and 10.

Code:



```python
def factorial(n):
    """
    Calculate factorial using a loop.
    - Returns 1 for 0
    - Prints an error message and returns None for negative numbers
    - Uses an iterative loop (no recursion)
    """
    if not isinstance(n, int):
        print("Error: factorial is only defined for integers")
        return None
    if n < 0:
        print("Error: factorial is not defined for negative numbers")
        return None
    result = 1
    for i in range(2, n + 1):
        result *= i
    return result

```



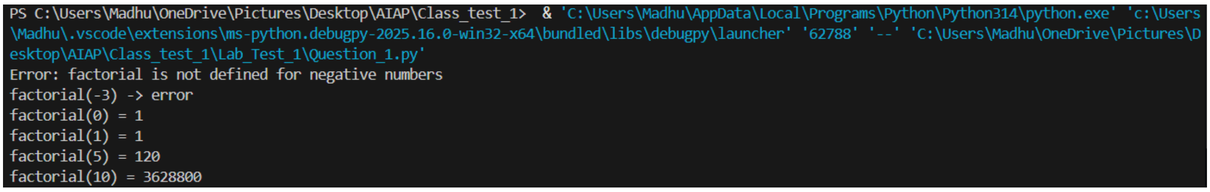
```python

if __name__ == "__main__":
    tests = [-3, 0, 1, 5, 10]
    for t in tests:
        res = factorial(t)
        if res is None:
            print(f"factorial({t}) -> error")
        else:
            print(f"factorial({t}) = {res}")

# Example output when run:
# Error: factorial is not defined for negative numbers
# factorial(-3) -> error
# factorial(0) = 1
# factorial(1) = 1
# factorial(5) = 120
# factorial(10) = 3628800

```

Output:



```
PS C:\Users\Madhu\OneDrive\Pictures\Desktop\AIAP\Class_test_1>  & 'C:\Users\Madhu\AppData\Local\Programs\Python\Python314\python.exe' 'c:\Users
\Madhu\.vscode\extensions\ms-python.debugpy-2025.16.0-win32-x64\bundled\libs\debugpy\launcher' '62788' '--' 'C:\Users\Madhu\OneDrive\Pictures\D
esktop\AIAP\Class_test_1\Lab_Test_1\Question_1.py'
Error: factorial is not defined for negative numbers
factorial(-3) -> error
factorial(0) = 1
factorial(1) = 1
factorial(5) = 120
factorial(10) = 3628800
```

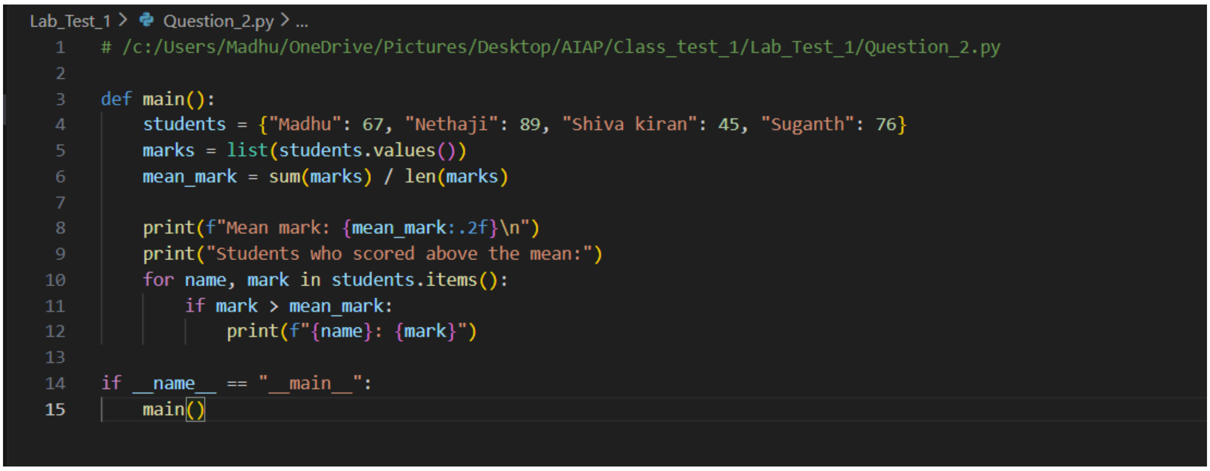
2. Q2. Given a list of student marks, compute the mean and list all students above the mean. Demonstrate zero-shot, one-shot, and few-shot prompts to guide an AI tool to solve this. Summarize the differences in approach.

(Each question carries 5 marks)

Prompt :

Write a Python program that takes a dictionary of student names and marks, calculates the mean mark, and prints all students who scored above the mean

Code:



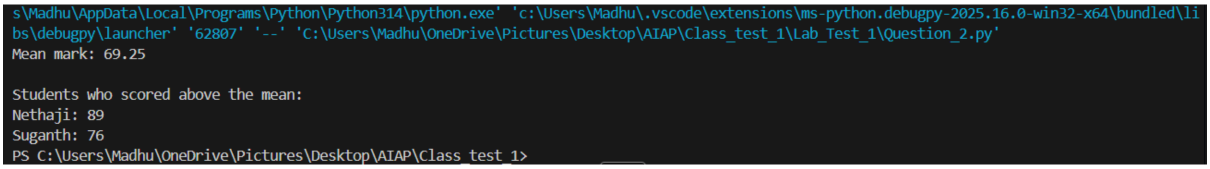
```python
# /c:/Users/Madhu/OneDrive/Pictures/Desktop/AIAP/Class_test_1/Lab_Test_1/Question_2.py

def main():
    students = {"Madhu": 67, "Nethaji": 89, "Shiva kiran": 45, "Suganth": 76}
    marks = list(students.values())
    mean_mark = sum(marks) / len(marks)

    print(f"Mean mark: {mean_mark:.2f}\n")
    print("Students who scored above the mean:")
    for name, mark in students.items():
        if mark > mean_mark:
            print(f"{name}: {mark}")

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

Output:



```
s\Madhu\AppData\Local\Programs\Python\Python314\python.exe' 'c:\Users\Madhu\.vscode\extensions\ms-python.debugpy-2025.16.0-win32-x64\bundled\li
bs\debugpy\launcher' '62807' '--' 'C:\Users\Madhu\OneDrive\Pictures\Desktop\AIAP\Class_test_1\Lab_Test_1\Question_2.py'
Mean mark: 69.25

Students who scored above the mean:
Nethaji: 89
Suganth: 76
PS C:\Users\Madhu\OneDrive\Pictures\Desktop\AIAP\Class_test_1>
```