

# AI ASSISTED CODING

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BATCH – 03

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## ASSIGNMENT – 3.2

**LAB – 03:** Prompt Engineering – Improving Prompts and Context Management.

**TASK - 01:** Progressive Prompting for Calculator Design.

**Prompt – 01:** Create a Python function named simple\_calculator.

**Code :**

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code cell contains the following Python function definition:

```
def simple_calculator(num1, num2, operation):
    if operation == 'add':
        return num1 + num2
    elif operation == 'subtract':
        return num1 - num2
    elif operation == 'multiply':
        return num1 * num2
    elif operation == 'divide':
        if num2 == 0:
            return "Error: Cannot divide by zero."
        else:
            return num1 / num2
    else:
        return "Error: Invalid operation. Choose from 'add', 'subtract', 'multiply', 'divide'."

# Example usage:
print("3 + 5 = " + str(simple_calculator(3, 5, 'add')))
print("10 - 4 = " + str(simple_calculator(10, 4, 'subtract')))
print("6 * 7 = " + str(simple_calculator(6, 7, 'multiply')))
print("12 / 3 = " + str(simple_calculator(12, 3, 'divide')))
print("10 / 0 = " + str(simple_calculator(10, 0, 'divide')))
print("5 ^ 2 = " + str(simple_calculator(5, 2, 'power')))
```

The code uses f-strings for printing results and includes comments explaining each step of the function logic. The Colab interface shows the code cell has been run successfully.

**Prompt – 02 :** Create a Python function named simple\_calculator that performs basic arithmetic operations (addition, subtraction, multiplication, division). Add comments explaining each step.

## Code:

```
def simple_calculator(num1, num2, operation):
    # Check the operation and perform the corresponding calculation
    if operation == 'add':
        # Perform addition
        return num1 + num2
    elif operation == 'subtract':
        # Perform subtraction
        return num1 - num2
    elif operation == 'multiply':
        # Perform multiplication
        return num1 * num2
    elif operation == 'divide':
        # Check for division by zero before performing division
        if num2 == 0:
            return "Error: Cannot divide by zero."
        # Perform division
        return num1 / num2
    else:
        # Handle invalid operation inputs
        return "Error: Invalid operation. Choose from 'add', 'subtract', 'multiply', 'divide'."

# Example usage of the simple_calculator function
print("3 + 5 = " + (simple_calculator(3, 5, 'add')))
print("10 - 4 = " + (simple_calculator(10, 4, 'subtract')))
print("6 * 7 = " + (simple_calculator(6, 7, 'multiply')))
print("12 / 3 = " + (simple_calculator(12, 3, 'divide')))
print("10 / 0 = " + (simple_calculator(10, 0, 'divide')))
print("5 ^ 2 = " + (simple_calculator(5, 2, 'power')))
```

**Prompt – 03 :** Create a Python function named `simple_calculator` that takes two numbers and an operator (+, -, \*, /) as input and returns the result. Include comments and provide at least two sample inputs with outputs.

## Code :

```
def simple_calculator(num1, num2, operator):
    # Check the operator and perform the corresponding calculation
    if operator == '+':
        # Perform addition
        return num1 + num2
    elif operator == '-':
        # Perform subtraction
        return num1 - num2
    elif operator == '*':
        # Perform multiplication
        return num1 * num2
    elif operator == '/':
        # Check for division by zero before performing division
        if num2 == 0:
            return "Error: Cannot divide by zero."
        # Perform division
        return num1 / num2
    else:
        # Handle invalid operator inputs
        return "Error: Invalid operator. Choose from '+', '-', '*', '/'.

# *** Sample Inputs and Outputs ***
# Sample 1: Addition
result_add = simple_calculator(15, 7, '+')
print("15 + 7 = " + (result_add))

# Sample 2: Subtraction
result_subtract = simple_calculator(20, 5, '-')
print("20 - 5 = " + (result_subtract))

# Sample 3: Multiplication
result_multiply = simple_calculator(4, 6, '*')
print("4 * 6 = " + (result_multiply))

# Sample 4: Division
result_divide = simple_calculator(100, 4, '/')
print("100 / 4 = " + (result_divide))

# Sample 5: Division by zero (error case)
result_div_by_zero = simple_calculator(5, 0, '/')
print(result_div_by_zero)
```

**TASK – 02 :** Refining Prompts for Sorting Logic

**Prompt – 01:** Write a Python Function to sort the Student Marks.

**Code :**

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code cell contains the following Python function:

```
def sort_student_marks(marks_list):
    # Create a copy of the list to avoid modifying the original list in-place
    sorted_marks = sorted(marks_list)
    return sorted_marks

# Example usage:
student_scores = [85, 92, 78, 65, 95, 88, 72]
print(f"Original marks: {student_scores}")
sorted_scores = sort_student_marks(student_scores)
print(f"Sorted marks (ascending): {sorted_scores}")

# Example with descending order (optional)
def sort_student_marks_descending(marks_list):
    # Sorts a list of student marks in descending order.
    return sorted(marks_list, reverse=True)

sorted_scores_desc = sort_student_marks_descending(student_scores)
print(f"Sorted marks (descending): {sorted_scores_desc}")
...
```

The output of the code cell shows the original scores and the sorted scores both in ascending and descending order.

**Prompt – 02:** Write a Python function that takes a list of student marks and sorts them in ascending order.

**Code :**

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code cell contains the following Python function:

```
def sort_student_marksAscending(marks_list):
    # Use the sorted() function to sort the list in ascending order
    sorted_marks = sorted(marks_list)
    return sorted_marks

# Example usage:
student_scores = [85, 92, 78, 65, 95, 88, 72]
print(f"Original marks: {student_scores}")

# Call the function to sort the marks
ascending_sorted_scores = sort_student_marksAscending(student_scores)
print(f"Sorted marks (ascending): {ascending_sorted_scores}")
...
```

The output of the code cell shows the original scores and the sorted scores in ascending order.

**Prompt – 03 :** Write an efficient Python function that takes a list of student marks (0–100), sorts them in descending order, removes duplicates, and returns the sorted list.

## Code :

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code defines a function `process\_student\_marks` that takes a list of marks, removes duplicates by converting it to a set, sorts the unique marks in descending order, and then converts it back to a list. It includes examples of how to use the function with lists containing duplicates.

```
def process_student_marks(marks_list):
    # Remove duplicates by converting to a set and then back to a list
    unique_marks = list(set(marks_list))

    # Sort the unique marks in descending order
    sorted_unique_marks = sorted(unique_marks, reverse=True)

    return sorted_unique_marks

# Example usage:
student_scores_with_duplicates = [85, 92, 78, 65, 95, 88, 72, 92, 65, 100, 78]
print(f"Original marks (with duplicates): {student_scores_with_duplicates}")

processed_scores = process_student_marks(student_scores_with_duplicates)
print(f"Processed marks (unique, descending): {processed_scores}")

# Another example
another_marks = [50, 60, 50, 70, 80, 70, 90, 60]
print(f"\nAnother set of marks: {another_marks}")
processed_another_marks = process_student_marks(another_marks)
print(f"Processed another set of marks: {processed_another_marks}")

... Original marks (with duplicates): [85, 92, 78, 65, 95, 88, 72, 92, 65, 100, 78]
Processed marks (unique, descending): [100, 92, 92, 88, 85, 78, 72, 70, 65, 60]
```

## TASK – 03: Few-Shot Prompting for Prime Number Validation.

**Prompt:** Write a Python function `is_prime(n)` that checks whether a given number is Prime or Not, Using Examples:

**I/P:** 2 -> O/P True

**I/P:** 4 -> O/P False

Handle edge cases like negative numbers and 0 properly.

## Code:

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code defines a function `is\_prime` that checks if a number is prime. It handles edge cases for negative numbers and 0. It only checks odd numbers up to the square root of n. The function returns True if no divisor is found, and False if a divisor is found.

```
def is_prime(n):
    # Handle edge cases: numbers less than or equal to 1 are not prime
    if n <= 1:
        return False
    # 2 is the only even prime number
    if n == 2:
        return True
    # All other even numbers are not prime
    if n % 2 == 0:
        return False

    # Check for divisibility from 3 up to the square root of n
    # Only check odd numbers
    i = 3
    while i * i <= n:
        if n % i == 0:
            return False
        i += 2

    return True

# Example usage:
print("Is 2 prime? ", is_prime(2))      # Expected: True
print("Is 4 prime? ", is_prime(4))      # Expected: False
print("Is 1 prime? ", is_prime(1))      # Expected: False
print("Is 17 prime? ", is_prime(17))    # Expected: True
print("Is 0 prime? ", is_prime(0))      # Expected: False
print("Is -5 prime? ", is_prime(-5))    # Expected: False
print("Is 29 prime? ", is_prime(29))    # Expected: True
print("Is 33 prime? ", is_prime(33))    # Expected: False
```

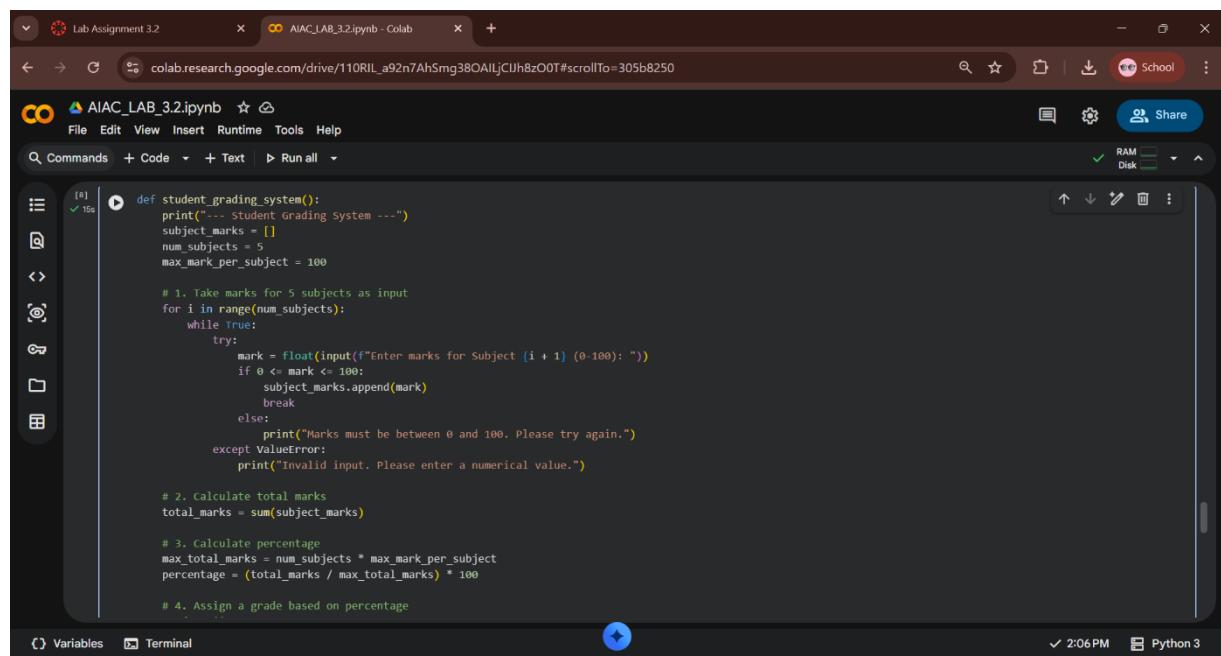
## **TASK – 04:** Prompt-Guided UI Design for Student Grading System.

**Prompt:** Design a simple Python-based user interface (CLI or GUI) for a student grading system.

The program should:

- Take marks for 5 subjects as input
- Calculate total marks
- Calculate percentage
- Assign a grade based on percentage
- Display all results clearly.

### **Code :**



The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code is written in Python and defines a function `student\_grading\_system` that performs the following steps:

- Prints a welcome message: "... Student Grading System ..."
- Creates an empty list `subject\_marks` to store marks for 5 subjects.
- Sets the number of subjects to 5 and the maximum mark per subject to 100.
- Takes marks for 5 subjects as input. It uses a while loop to repeatedly ask for input until valid numerical values are entered between 0 and 100. If the input is invalid (not a float), it prints an error message and asks again.
- Calculates the total marks by summing the `subject\_marks` list.
- Calculates the percentage by dividing the total marks by the maximum total marks (5 \* 100) and multiplying by 100.
- Assigns a grade based on the calculated percentage. The grades are: A (90-100), B (80-89), C (70-79), D (60-69), and E (0-59).

The code is displayed in a dark-themed code editor with syntax highlighting. The bottom status bar shows the time as 2:06PM and the Python version as Python 3.

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code cell contains the following Python script:

```
# 4. Assign a grade based on percentage
grade = ''
if percentage >= 90:
    grade = 'A+'
elif percentage >= 80:
    grade = 'A'
elif percentage >= 70:
    grade = 'B+'
elif percentage >= 60:
    grade = 'B'
elif percentage >= 50:
    grade = 'C'
elif percentage >= 40:
    grade = 'D'
else:
    grade = 'F'

# 5. Display all results clearly
print("\n--- Results ---")
for i, mark in enumerate(subject_marks):
    print(f"Subject {i + 1} Marks: {mark:.2f}")
print(f"Total Marks: {total_marks:.2f} / {max_total_marks}")
print(f"Percentage: {percentage:.2f}%")
print(f"Grade: {grade}")
print("-----")

# Run the grading system
student_grading_system()
```

The status bar at the bottom right indicates "2:06 PM" and "Python 3".

## Output:

The screenshot shows the output of the previous code execution in Google Colab. The terminal output is as follows:

```
print(f"Total Marks: {total_marks:.2f} / {max_total_marks}")
print(f"Percentage: {percentage:.2f}%")
print(f"Grade: {grade}")
print("-----")

# Run the grading system
student_grading_system()

...
--- Student Grading System ---
Enter marks for Subject 1 (0-100): 98
Enter marks for Subject 2 (0-100): 54
Enter marks for Subject 3 (0-100): 99
Enter marks for Subject 4 (0-100): 45
Enter marks for Subject 5 (0-100): 32

--- Results ---
Subject 1 Marks: 98.00
Subject 2 Marks: 54.00
Subject 3 Marks: 99.00
Subject 4 Marks: 45.00
Subject 5 Marks: 32.00
Total Marks: 328.00 / 500
Percentage: 65.60%
Grade: B
-----
```

The status bar at the bottom right indicates "2:06 PM" and "Python 3".

## TASK – 05 : Analyzing Prompt Specificity in Unit Conversion Functions.

Prompt – 01 : Write a function to convert distance.

## Code:

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code cell contains a function named `convert\_distance` which converts distances between various units (meters, kilometers, miles, feet) using conversion factors stored in a dictionary. The code includes error handling for invalid input and output units. Example usage is shown at the bottom of the function definition.

```
[1] def convert_distance(value, unit_in, unit_out):
    # Conversion factors to meters (as a base unit)
    conversion_factors_to_meters = {
        'm': 1.0,           # meters
        'km': 1000.0,       # kilometers to meters
        'mi': 1609.34,      # miles to meters
        'ft': 0.3048        # feet to meters
    }
    # Convert input units to lowercase for case-insensitivity
    unit_in = unit_in.lower()
    unit_out = unit_out.lower()
    if unit_in not in conversion_factors_to_meters:
        return f"Error: Invalid input unit '{unit_in}'. Choose from {list(conversion_factors_to_meters.keys())}."
    if unit_out not in conversion_factors_to_meters:
        return f"Error: Invalid output unit '{unit_out}'. Choose from {list(conversion_factors_to_meters.keys())}."
    # Convert input value to meters first
    value_in_meters = value * conversion_factors_to_meters[unit_in]
    # Convert from meters to the desired output unit
    converted_value = value_in_meters / conversion_factors_to_meters[unit_out]
    return converted_value
# Example Usage:
print("10 kilometers to meters: {convert_distance(10, 'km', 'm')}")
print("5 miles to kilometers: {convert_distance(5, 'mi', 'km')}")
print("100 feet to meters: {convert_distance(100, 'ft', 'm')}")
print("2000 meters to miles: {convert_distance(2000, 'm', 'mi')}")
print("100 meters to feet: {convert_distance(100, 'm', 'ft')}")
# Example of invalid unit
print("10 league to miles: {convert_distance(10, 'league', 'mi')}")
print("5 meters to yards: {convert_distance(5, 'm', 'yd')}")
```

**Prompt – 02:** Write a Python function to convert kilometers to miles.

## Code :

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code cell has a title "USING PROMPT 02" above it. The function `convert\_distance` is identical to the one in the previous screenshot, performing unit conversions between meters, kilometers, miles, and feet. The code includes error handling for invalid input and output units.

```
[1] USING PROMPT 02
def convert_distance(value, unit_in, unit_out):
    # Conversion factors to meters (as a base unit)
    conversion_factors_to_meters = {
        'm': 1.0,           # meters
        'km': 1000.0,       # kilometers to meters
        'mi': 1609.34,      # miles to meters
        'ft': 0.3048        # feet to meters
    }
    # Convert input units to lowercase for case-insensitivity
    unit_in = unit_in.lower()
    unit_out = unit_out.lower()
    if unit_in not in conversion_factors_to_meters:
        return f"Error: Invalid input unit '{unit_in}'. Choose from {list(conversion_factors_to_meters.keys())}."
    if unit_out not in conversion_factors_to_meters:
        return f"Error: Invalid output unit '{unit_out}'. Choose from {list(conversion_factors_to_meters.keys())}."
    # Convert input value to meters first
    value_in_meters = value * conversion_factors_to_meters[unit_in]
    # Convert from meters to the desired output unit
    converted_value = value_in_meters / conversion_factors_to_meters[unit_out]
    return converted_value
```

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code cell contains Python functions for unit conversion between meters, kilometers, and miles. The code includes comments explaining the logic and provides example usage for both a dedicated function and a general converter.

```
[18]  ✓ 0s
File Edit View Insert Runtime Tools Help
Commands + Code + Text ▶ Run all ▾
[18]  ✓ 0s
  value_in_meters = value * conversion_factors_to_meters[unit_in]
  # Convert from meters to the desired output unit
  converted_value = value_in_meters / conversion_factors_to_meters[unit_out]
  return converted_value

def kilometers_to_miles(kilometers):
  # 1 kilometer is approximately 0.621371 miles
  miles = kilometers * 0.621371
  return miles

# Example usage of the dedicated function:
km_value = 10
miles_result = kilometers_to_miles(km_value)
print(f"{km_value} kilometers is equal to {miles_result:.2f} miles (using dedicated function.)")

# Example usage with the general convert_distance function:
converted_miles = convert_distance(km_value, 'km', 'mi')
print(f"{km_value} kilometers is equal to {converted_miles:.2f} miles (using general converter.)")
...
10 kilometers is equal to 6.21 miles (using dedicated function).
10 kilometers is equal to 6.21 miles (using general converter).
```

**Prompt - 03 :** Write two Python functions:

1. km\_to\_miles(km)
2. miles\_to\_km(miles)

Use correct conversion factors, add comments, and provide sample inputs and outputs.

**Code :**

The screenshot shows a Google Colab notebook titled "AIAC\_LAB\_3.2.ipynb". The code cell contains the following Python script:

```
[1]: def km_to_miles(km):
    # Conversion factor: 1 kilometer = 0.621371 miles
    miles = km * 0.621371
    return miles

def miles_to_km(miles):
    # Conversion factor: 1 mile = 1.60934 kilometers
    km = miles * 1.60934
    return km

# ---- Sample Inputs and Outputs for km_to_miles ---
kilometers_1 = 10
miles_output_1 = km_to_miles(kilometers_1)
print(f"{kilometers_1} kilometers is equal to {miles_output_1:.2f} miles")

kilometers_2 = 50
miles_output_2 = km_to_miles(kilometers_2)
print(f"{kilometers_2} kilometers is equal to {miles_output_2:.2f} miles")

# ---- Sample Inputs and Outputs for miles_to_km ---
miles_1 = 6.21
km_output_1 = miles_to_km(miles_1)
print(f"{miles_1} miles is equal to {km_output_1:.2f} kilometers")

miles_2 = 31.07
km_output_2 = miles_to_km(miles_2)
print(f"{miles_2} miles is equal to {km_output_2:.2f} kilometers")
```

The code defines two functions: `km_to_miles` and `miles_to_km`. It then uses these functions to print sample outputs for both conversions.

**THANK YOU!!**