

AI ASSISTED CODING

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BATCH – 03

20 – 01 – 2026

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 :

```
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."
        return num1 / num2
    else:
        return "Error: Invalid operation. Choose from 'add', 'subtract', 'multiply', 'divide'."

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

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(f"3 + 5 = {simple_calculator(3, 5, 'add')}")
print(f"10 - 4 = {simple_calculator(10, 4, 'subtract')}")
print(f"6 * 7 = {simple_calculator(6, 7, 'multiply')}")
print(f"12 / 3 = {simple_calculator(12, 3, 'divide')}")
print(f"10 / 0 = {simple_calculator(10, 0, 'divide')}")
print(f"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(f"15 + 7 = {result_add}")

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

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

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

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

TASK – 02 : Refining Prompts for Sorting Logic

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

Code :

```

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}")

*** Original marks: [85, 92, 78, 65, 95, 88, 72]
    Sorted marks (ascending): [65, 72, 78, 85, 88, 92, 95]
    Sorted marks (descending): [95, 92, 88, 85, 78, 72, 65]

```

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

Code :

```

def sort_student_marks_ascending(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_marks_ascending(student_scores)
print(f"Sorted marks (ascending): {ascending_sorted_scores}")

*** Original marks: [85, 92, 78, 65, 95, 88, 72]
    Sorted marks (ascending): [65, 72, 78, 85, 88, 92, 95]

```

+ Code + Text

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 :

```
[6] ✓ Os
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, 95, 92, 88, 85, 78, 72, 65, 60]
```

TASK – 03 : Few-Shot Prompting for Prime Number Validation. **Prompt :** Write a Python function is_prime(n) that checks whether a given 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:

```
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(f"Is 2 prime? {is_prime(2)}") # Expected: True
print(f"Is 4 prime? {is_prime(4)}") # Expected: False
print(f"Is 1 prime? {is_prime(1)}") # Expected: False
print(f"Is 17 prime? {is_prime(17)}") # Expected: True
print(f"Is 0 prime? {is_prime(0)}") # Expected: False
print(f"Is -5 prime? {is_prime(-5)}") # Expected: False
print(f"Is 29 prime? {is_prime(29)}") # Expected: True
print(f"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 :

```
def student_grading_system():
    print("--- Student Grading System ---")
    subject_marks = []
    num_subjects = 5
    max_mark_per_subject = 100

    # 1. Take marks for 5 subjects as input
    for i in range(num_subjects):
        while True:
            try:
                mark = float(input(f"Enter marks for Subject {i + 1} (0-100): "))
                if 0 <= mark <= 100:
                    subject_marks.append(mark)
                    break
            except:
                print("Marks must be between 0 and 100. Please try again.")
        except ValueError:
            print("Invalid input. Please enter a numerical value.")

    # 2. Calculate total marks
    total_marks = sum(subject_marks)

    # 3. Calculate percentage
    max_total_marks = num_subjects * max_mark_per_subject
    percentage = (total_marks / max_total_marks) * 100

    # 4. Assign a grade based on percentage
```

```
[#] 10s

# 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()
```

Output:

```
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
-----
```

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

Prompt – 01 : Write a function to convert distance.

Code:

```
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(f"10 kilometers to meters: {convert_distance(10, 'km', 'm')} m")
print(f"5 miles to kilometers: {convert_distance(5, 'mi', 'km')} km")
print(f"100 feet to meters: {convert_distance(100, 'ft', 'm')} m")
print(f"2000 meters to miles: {convert_distance(2000, 'm', 'mi')} mi")
print(f"100 meters to feet: {convert_distance(100, 'm', 'ft')} ft")
# Example of invalid unit
print(f"10 league to miles: {convert_distance(10, 'league', 'mi')}")
print(f"5 meters to yards: {convert_distance(5, 'm', 'yd')}")
```

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

Code :

```
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
```

```
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:

```
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")
```

THANK YOU!!