## Instructions for Assignment Submission:

The scenario statements (stories) are short and precise, and the task is provided. From the next assignments, the scenario will be longer, and the task section will be omitted. You will need to analyze the scenario to determine what task needs to be performed.

- **Submission Guidelines**
  1) Adhere to Deadlines: Submit your assignments on or before the due date provided by your subject faculty. Late submissions may result in a penalty or may not be accepted. 2) Mode of Submission: Follow the submission mode specified by your subject faculty. If the faculty requests a soft copy, submit the source code. If handwritten submission is required, follow the instructions accordingly.
  3) Proper Formatting: Ensure your solutions are properly indented. Statements within a block or scope should be indented with one tab.
  4) Identification: Include your name, university roll number, program details, and section on your submission.
  5) Original Work: Ensure that all work submitted is your own. Plagiarism or copying will result in severe academic penalties.

- **Steps for Submission**
  1) Read Assignment Details Carefully: Understand the problem statement and requirements before starting your work. Ask your instructor if you need any clarifications.
  2) Format of Submission: For soft copy submissions, compile your source code files (.py files) and other necessary documents into a single compressed (zip) file.
     - Name your zip file according to the format: RollNumber_AssignmentNumber.zip (e.g., 2415000012_Assignment1.zip).
  3) Handwritten Submissions: Ensure your handwritten assignments are neat and legible.
     - Include your name, university roll number, program details, and section on the top of each page.
  4) Verification: Double-check that you have included all required components in your submission.
     - Verify that your code compiles and runs correctly if a soft copy is submitted.

- **Academic Integrity**
  1) Originality: Submit work that is entirely your own. Plagiarism or copying will result in severe academic consequences.
  2) Collaboration: While discussing ideas with classmates is encouraged, direct sharing of code or solutions is prohibited.

By following these instructions, you will ensure that your assignments meet the required standards and are submitted correctly. Best of luck with your assignments, and happy learning!

## Assignment: 02

## (Topics: Operators & Expressions)

## Difficulty Level: Easy

**Deadline: Friday, 06 Sep 2024. Submission Mode: Handwritten | Pain Paper[Notebook]**

Scenario 1: Student Marks Calculation Story:

In a school, the marks of three subjects (Mathematics, Science, and English) for each student are recorded as integers. The school wants to calculate the total and average marks of each student. The average should be a floating-point number with two decimal places. Additionally, the school wants to assign an identifier to each student based on their roll number (an integer).

Task:

1. Input the Roll Number and Marks for the three subjects.

2. Calculate the Total Marks and Average Marks.

3. Display the Roll Number, Marks for each subject, Total Marks, Average Marks,

Sample Test Cases:

- Test Case 1:

- **Input:**

- Roll Number: 101

- Mathematics: 85

- Science: 90

- English: 88

- **- Output:**

- Roll Number: 101

- Mathematics: 85

- Science: 90

- English: 88

- Total Marks: 263

- Average Marks: 87.67

- Test Case 2:

- **Input:**

- Roll Number: 102

- Mathematics: 75

- Science: 80

- English: 78

- **Output:**

- Roll Number: 102

- Mathematics: 75

- Science: 80

- English: 78

- Total Marks: 233

- Average Marks: 77.67

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Scenario 2: Employee Performance Evaluation Story:

A company evaluates employee performance based on three key performance indicators (KPIs): Productivity, Efficiency, and Reliability. Each KPI is rated on a scale of 1 to 10, and these ratings are stored as integers. The company assigns a performance score to each employee based on the average of the three KPIs. This average should be a floating-point number with two decimal places.

Task:

1. Define variables for Employee ID (int), Ratings for three KPIs (int), and Performance Score (float).
2. Input the Employee ID and Ratings for the three KPIs.
3. Calculate the Performance Score as the average of the three KPIs.
4. Display the Employee ID, Ratings for each KPI, and Performance Score formatted to two decimal places.

Sample Test Cases:

- **Test Case 1:**

- **Input:**

- Employee ID: 201

- Productivity: 8

- Efficiency: 9

- Reliability: 7

- **Output:**

- Employee ID: 201

- Productivity: 8

- Efficiency: 9

- Reliability: 7

- Performance Score: 8.00

- **Test Case 2:**

- **Input:**

- Employee ID: 202

- Productivity: 7

- Efficiency: 8

- Reliability: 8

- **Output:**

- Employee ID: 202

- Productivity: 7

- Efficiency: 8

- Reliability: 8

- Performance Score: 7.67

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Scenario 3: Product Price Calculation Story:

A store maintains the prices of its products, including a discount percentage. Each product has a unique product ID (an integer), and its price and discount are stored as floating-point numbers. The store calculates the final price after applying the discount. The final price should be displayed with two decimal places.

Task:

1. Define variables for Product ID (int), Original Price (float), Discount Percentage (float), and Final Price (float).

2. Input the Product ID, Original Price, and Discount Percentage.

3. Calculate the Final Price by applying the discount to the Original Price.

4. Display the Product ID, Original Price, Discount Percentage, and Final Price formatted to two decimal places.

Sample Test Cases:

- **Test Case 1:**

- **Input:**

- Product ID: 301

- Original Price: 100.00

- Discount Percentage: 10.0

- **Output:**

- Product ID: 301

- Original Price: 100.00

- Discount Percentage: 10.00

- Final Price: 90.00

- **Test Case 2:**

- **Input:**

- Product ID: 302

- Original Price: 200.00

- Discount Percentage: 15.0

- **Output:**

- Product ID: 302

- Original Price: 200.00

- Discount Percentage: 15.00

- Final Price: 170.00

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Scenario 4: Bitwise Operations on IDs

Story:

A technology company manages the IDs of its devices using bitwise operations to encode and decode various parameters. Each device has a unique ID (an integer). The company uses bitwise AND, OR, and XOR operations to manipulate these IDs for various purposes.

Task:

1. Define a variable for Device ID (int).

2. Input the Device ID.

3. Apply bitwise AND with a mask value (e.g., 0xFF) to extract specific bits.

4. Apply bitwise OR with another mask value (e.g., 0xAA) to set specific bits.

5. Apply bitwise XOR with yet another mask value (e.g., 0x55) to toggle specific bits.

6. Display the original Device ID, and the results of the bitwise operations.

Sample Test Cases:

- **Test Case 1:**

- **Input:**

- Device ID: 240

- Output:

- Original ID: 240

- AND Result: 240

- OR Result: 250

- XOR Result: 179

- **Test Case 2:**

- **Input:**

- Device ID: 128

- **Output:**

- Original ID: 128

- AND Result: 128

- OR Result: 170

- XOR Result: 171

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Scenario 5: Insurance Premium Calculation Story:

An insurance company calculates the premium for different policies based on the age and risk factor of the policyholder. The age is an integer, and the risk factor is a floating-point number. The premium is calculated using the formula:

Premium=Base Premium×(1+Risk Factor) The

base premium is a constant value.

Task:

1. Define variables for Age (int), Risk Factor (float), Base Premium (float), and Final Premium (float).
2. Input the Age and Risk Factor.
3. Calculate the Final Premium using the given formula.
4. Display the Age, Risk Factor, and Final Premium formatted to two decimal places.

Sample Test Cases:

- **Test Case 1:**

- **Input:**

- Age: 30

- Risk Factor: 0.20

- **Output:**

- Age: 30

- Risk Factor: 0.20

- Final Premium: 120.00 (assuming Base Premium is 100.00)

- **Test Case 2:**

- **Input:**

- Age: 45

- Risk Factor: 0.35

- **Output:**

- Age: 45

- Risk Factor: 0.35

- Final Premium: 135.00 (assuming Base Premium is 100.00)

Scenario 6: Warehouse Stock Management Story:

A warehouse tracks the stock levels of various products using unique identifiers. Each product has a stock level (an integer), a reorder threshold, and a reorder amount. The warehouse calculates whether a product needs to be reordered and the new stock level after a reorder.

Task:

1. Define variables for Product ID (int), Stock Level (int), Reorder Threshold (int), and Reorder Amount (int).
2. Input the Product ID, Stock Level, Reorder Threshold, and Reorder Amount.
3. Use a ternary operator to determine if a reorder is needed based on the Stock Level and Reorder Threshold.
4. Calculate the new Stock Level after a reorder if needed.
5. Display the Product ID, Stock Level, Reorder Threshold, Reorder Amount, and New Stock Level.

Sample Test Cases:

- **Test Case 1:**

- **Input:**

- Product ID: 401

- Stock Level: 50

- Reorder Threshold: 60

- Reorder Amount: 100

- **Output:**

- Product ID: 401

- Stock Level: 50

- Reorder Threshold: 60

- Reorder Amount: 100

- New Stock Level: 150

- **Test Case 2:**

- **Input:**

- Product ID: 402

- Stock Level: 70

- Reorder Threshold: 50

- Reorder Amount: 100

- **Output:**

- Product ID: 402

- Stock Level: 70

- Reorder Threshold: 50

- Reorder Amount: 100

- New Stock Level: 70

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Scenario 7: GPA Calculation for Students Story:

A university calculates the GPA of students based on their grades in three subjects. Each grade is stored as a floating-point number, and the GPA is the average of these grades. The university assigns a student ID to each student (an integer).

Task:

1. Define variables for Student ID (int), Grades for three subjects (float), and GPA (float).

2. Input the Student ID and Grades for the three subjects.

3. Calculate the GPA as the average of the three grades.

4. Display the Student ID, Grades for each subject, and GPA formatted to two decimal places.

Sample Test Cases:

- **Test Case 1:**

- **Input:**

- Student ID: 501

- Grade 1: 3.5

- Grade 2: 3.8

- Grade 3: 4.0

- **Output:**

- Student ID: 501

- Grade 1: 3.5

- Grade 2: 3.8

- Grade 3: 4.0

- GPA: 3.77

- **Test Case 2:**

- **Input:**

- Student ID: 502

- Grade 1: 3.0

- Grade 2: 3.2

- Grade 3: 3.4

- **Output:**

- Student ID: 502

- Grade 1: 3.0

- Grade 2: 3.2

- Grade 3: 3.4

- GPA: 3.20

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Scenario 8: Temperature Conversion Story:

A weather monitoring system records temperatures in Celsius. The system needs to convert these temperatures to Fahrenheit for display purposes. The temperature in Celsius is a floating-point number, and the temperature in Fahrenheit is calculated using the formula:

Fahrenheit=Celsius×9/5+32 Task:

1. Define variables for Temperature in Celsius (float) and Temperature in Fahrenheit (float).
2. Input the Temperature in Celsius.
3. Calculate the Temperature in Fahrenheit using the given formula.
4. Display the Temperature in Celsius and Temperature in Fahrenheit formatted to two decimal places.

Sample Test Cases:

- **Test Case 1:**

- **Input:**

- Celsius: 25.0

- **Output:**

- Celsius: 25.00

- Fahrenheit: 77.00

- **Test Case 2:**

- **Input:**

- Celsius: 0.0

- Output:

- Celsius: 0.00

- Fahrenheit: 32.00

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Scenario 9: Loan Interest Calculation Story:

A bank provides loans to customers and calculates the interest based on the principal amount, interest rate, and time period. The principal amount is an integer, the interest rate is a floatingpoint number, and the time period is an integer (in years). The interest is calculated using the formula:

Interest=Principal×Rate×Time Task:

1. Define variables for Principal Amount (int), Interest Rate (float), Time Period (int), and Interest (float).
2. Input the Principal Amount, Interest Rate, and Time Period.
3. Calculate the Interest using the given formula.
4. Display the Principal Amount, Interest Rate, Time Period, and Interest formatted to two decimal places.

Sample Test Cases:

- **Test Case 1:**

- **Input:**

- Principal: 10000

- Rate: 0.05

- Time: 2

- **Output:**

- Principal: 10000

- Rate: 0.05

- Time: 2

- Interest: 1000.00

- **Test Case 2:**

- **Input:**

- Principal: 20000

- Rate: 0.04

- Time: 3 - Output:

- Principal: 20000

- Rate: 0.04

- Time: 3

- Interest: 2400.00

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Scenario 10: Electricity Bill Calculation Story:

An electricity company calculates the bill for its customers based on the units consumed. The units consumed are an integer, and the rate per unit is a floating-point number. The total bill amount is calculated as:

Total Bill=Units Consumed×Rate per Unit

Task:

1. Define variables for Customer ID (int), Units Consumed (int), Rate per Unit (float), and Total Bill (float).
2. Input the Customer ID, Units Consumed, and Rate per Unit.
3. Calculate the Total Bill using the given formula.
4. Display the Customer ID, Units Consumed, Rate per Unit, and Total Bill formatted to two decimal places.

Sample Test Cases:

- **Test Case 1:**

- **Input:**

- Customer ID: 601

- Units Consumed: 100

- Rate per Unit: 1.5

- **Output:**

- Customer ID: 601

- Units Consumed: 100

- Rate per Unit: 1.50

- Total Bill: 150.00

- **Test Case 2:**

- **Input:**

- Customer ID: 602

- Units Consumed: 200

- Rate per Unit: 1.2

- **Output:**

- Customer ID: 602

- Units Consumed: 200

- Rate per Unit: 1.20

- Total Bill: 240.00