Task 1

Write the Python code of a program that reads two numbers from the user, and prints their sum, product, and difference.

Hint: subtract the second number from the first one

===

Example 1:

Sample Input:

4

5

Sample Output:

Sum = 9

Product = 20

Difference = -1

===

Example 2:

Sample Input:

30

2

Sample Output:

Sum = 32

Product = 60

Difference = 28

===

For your explanation, the first question's code is done below. Try relating the block of code with the lessons you have learned and try to understand the significance of each line. You're most welcome to copy and paste the code on your IDE and play around with the code. This will strengthen your understanding.

```
# First, we take 2 numbers as input from the user
# Read 2 numbers as input from the user means taking 2 numbers as input
from the user using the input function
```

```python
var_1 = input('Please enter the first number: ')
var_2 = input('Please enter the second number: ')

#Since input() function converts everything to String,
#For performing any kind of mathematical operation we need to convert
them to int.
#For this conversion, we need to use the int() function



#But at first, we may clarify whether the inputs are actually Strings or
not.
print(type(var_1))
print(type(var_2))

#Then we convert the Strings to integer using the int() function
var_3 = int(var_1)
var_4 = int(var_2)

#Input taking and conversion can be done in a single line as shown below
#var_1 = int(input('Please enter the first number: '))
#var_2 = int(input('Please enter the second number: '))

#We may then perform Addition
total = var_3 + var_4

#Multiplication
product = var_3 * var_4

#Subtraction
difference = var_3 - var_4

#And then print all the calculated results
print("Sum =", total)
print("Product =", product)
print("Difference =", difference)
```

Task 2

Write the Python code of a program that reads the radius of a circle and prints its circumference and area.

===

*hint(1): we may import math and then use **math.pi** for getting the value of pi.*

For details, we can read from https://docs.python.org/3/library/math.html

*hint(2): we can import math and use the math function for making squares with math.pow(number, power) or we can simply use the power operator. For example: S**2.*

===

Example 1:

Sample Input:

4

Sample Output:

Area is 50.26548245743669

Circumference is 25.132741228718345

==

Example 2:

Sample Input:

3.5

Sample Output:

Area is 38.48451000647496

Circumference is 21.991148575128552

For your understanding, the first part of the question (area calculation) is done below. Please copy and paste the code to your solution .ipynb file and complete the rest of the code for circumference calculation.

```python
import math

# taking input from the user, then converting it to float
# since radius can be a floating point value

radius  = float(input("Please enter the radius value:"))

# squares can be made using these 3 ways, as give in hints
# all 3 ways generates the same result for area

area = math.pi * radius ** 2
print("Area is:", area)

area = math.pi * math.pow(radius, 2)
print("Area is:", area)

area = math.pi * radius * radius
print("Area is:", area)


#================================================================
# TODO
# calculate circumference

#================================================================
```

Task 3

Write the Python code of a program that reads two numbers from the user. The program should then print "First is greater" if the first number is greater, "Second is greater" if the second number is greater, and "The numbers are equal" otherwise.

==

Sample Input 1:

7

3

Sample Output 1:

First is greater

==

Sample Input 2:

-33

-3

Sample Output 2:

Second is greater

==

Sample Input 1:

11

11

Sample Output 1:

The numbers are equal

Task 4

Write the Python code of a program that reads two numbers, subtracts the smaller number from the larger one, and prints the result.

Hint: First, we may check which number is greater

==

Sample Input 1:

-40

-4

Sample Output 1:

36

Explanation: -4 > -40 so -4 - (-40) = -4 + 40 = 36

===

Sample Input 2:

6

2

Sample Output 2:

4

===

Sample Input 3:

5

5

Sample Output 3:

0

Task 5

Write the Python code of a program that reads a number, and prints "The number is even" or "The number is odd", depending on whether the number is even or odd.

hint(1): we may use the modulus (%) operator to check for even or odd

hint(2): we can consider the number to be an integer

===

Sample Input 1:

7

Sample Output 1:

The number is odd

===

Sample Input 2:

10

Sample Output 2:

The number is even

===

Sample Input 3:

-44

Sample Output 3:

The number is even

Task 6

Write the Python code of a program that reads an integer as input from the user, and prints the integer if it is a multiple of **2 OR 5** and prints "Not a multiple of 2 OR 5" otherwise.

For example, 2, 4, 5, 6, 8, 10, 12, 14, 15, 16, 18, 20, 22 … i.e. this includes multiples of 2 only, multiples of 5 only and multiples of 2 and 5 both.

==

hint(1): we may use the modulus (%) operator for checking the divisibility

hint(2): we can consider the number to be an integer

==

Sample Input 1:

5

Sample Output 1:

5

==

Sample Input 2:

10

Sample Output 2:

10

==

Sample Input 3:

3

Sample Output 3:

Not a multiple of 2 OR 5

Task 7

Write the Python code of a program that reads an integer, and prints the integer it is a multiple of **either 2 or 5 but not both.** If the number is a multiple of 2 and 5 both, then print "Multiple of 2 and 5 both". For all other numbers, the program prints "Not a multiple we want".

For example, 2, 4, 5, 6, 8, 12, 14, 15, 16, 18, 22 … i.e. this includes multiples of 2 only and multiples of 5 only, NOT multiples of 2 and 5 both or other numbers.

==

hint(1): we may use the modulus (%) operator for checking the divisibility

hint(2): we can consider the number to be an integer

==

Sample Input 1:

6

Sample Output 1:

6

==

Sample Input 2:

15

Sample Output 2:

15

==

Sample Input 3:

10

Sample Output 3:

Multiple of 2 and 5 both

==

Sample Input 4:

17

Sample Output 4:

Not a multiple we want

Task 8

Write the Python code of a program that reads an integer, and prints the integer if it is a multiple of **2 AND 5** and prints "Not multiple of 2 and 5 both" otherwise.

==

For example, 10, 20, 30, 40, 50 … i.e. this only includes numbers which are multiples of both 2 and 5.

==

hint(1): we may use the modulus (%) operator for checking the divisibility

hint(2): we can consider the number to be an integer

==

Sample Input 1:

30

Sample Output 1:

30

==

Sample Input 2:

15

Sample Output 2:

Not multiple of 2 and 5 both

==

Sample Input 3:

6

Sample Output 3:

Not multiple of 2 and 5 both

Task 9

Write the Python code of a program that finds the number of hours, minutes, and seconds in a **given number of seconds.** The number of seconds is taken as input from the user.

==

hint(1): we may consider our user input to be an integer value and use // and % operators to solve the problem

hint(2): 1 hour = 60 mins = 3600 seconds and 1 min = 60 seconds

==

Sample Input 1:

10000

Sample Output 1:

Hours: 2 Minutes: 46 Seconds: 40

Explanation:

10000 seconds = 10000 // 3600 = 2 hours and 10000 % 3600 = 2800 seconds.

Then again, 2800 // 60 = 46 minutes and 2800 % 60 = 40 seconds.

And hence we have arrived at our answer.

==

Sample Input 2:

500

Sample Output 2:

Hours: 0 Minutes: 8 Seconds: 20

Task 10

Write a Python program to compute and display a person's weekly salary as determined by the following conditions:

- If the hours worked is less than or equal to 40, then the person receives Tk 200 per hour.

- If the hours worked is greater than 40, then the person receives Tk 8000 plus Tk 300 for each hour worked over 40 hours.

The program should request the hours worked as an input from the user and display the salary as output. You need to make sure that user input is valid. For example, a person cannot work for -5 hours or more than 168 hours in a week. So, the valid hours range is 0 to 168. For invalid hours, print outputs as given in the samples below.

Hint: you can consider the hour (user input) to be an integer

==

Sample Input 1:

100

Sample Output 1:

26000

Explanation: Since, the number of hours worked is 100 > 40, therefore salary = 8000 + (100 - 40) * 300 = 26000.

==

Sample Input 2:

30

Sample Output 2:

6000

Explanation: Since, the number of hours worked is 30 < 40, therefore salary = 30 * 200 = 6000.

==

Sample Input 3:

-30

Sample Output 3:

Hour cannot be negative

==

Sample Input 4:

170

Sample Output 4:

Impossible to work more than 168 hours weekly

Task 11

Suppose the following expressions are used to calculate the values of L for different values of S:

$$L = 3000 - 125S^2 \text{ if } S < 100$$

$$L = \frac{12000}{4 + S^2/14900} \text{ if } S \geq 100$$

Write the Python code of a program that reads a value of S and then calculates the value of L.

==

*hint(1): you can import math and use math function for making squares with math.pow(number, power) or you can simply write S ** 2.*

hint(2): the value of S(user input) will be an integer

==

Sample Input 1:

120

Sample Output 1:

2416.2162162162163

Explanation: Since S (user input) given here is 120 >= 100, so L = 12000 / (4 + (120 * 120)/14900) = 2416.2162162162163

==

Sample Input 2:

3

Sample Output 2:

1875

Explanation: Since S (user input) given here is 3 < 100, so L = 3000 - 125 * 3 * 3 = 1875

Task 12

Write a Python program that takes an hour from the user as input and tells it is time for which meal.

• The user will input the number in a 24-hour format. So, 14 means 2 pm, 3 means 3 am, 18 means 6 pm, etc.

• Valid inputs are 0 to 23. Inputs less than 0 or more than 23 are invalid in 24-hour clock.

• Assume, input will be whole numbers. For example, 3.5 will NOT be given as input.

===

Input range: Message to be printed

4 to 6: Breakfast

12 to 13: Lunch

16 to 17: Snacks

19 to 20: Dinner

For all other valid inputs, say "Patience is a virtue"

For all other invalid inputs, say "Wrong time"

===

For example,

If the user enters 4, your program should print the message "Breakfast".

If the user enters 5, your program should print the message "Breakfast".

If the user enters 6, your program should print the message "Breakfast".

If the user enters 0, your program should print the message "Patience is a virtue".

If the user enters 1, your program should print the message "Patience is a virtue".

If the user enters 18, your program should print the message "Patience is a virtue".

If the user enters 23, your program should print the message "Patience is a virtue".

If the user enters 24, your program should print the message "Wrong Time".

If the user enters -1, your program should print the message "Wrong Time".

If the user enters 27, your program should print the message "Wrong time".

===

Hints: You can use nested conditionals (if-else) or chained conditions (if-elif-else) to solve this problem.

Task 13

Write the Python code of a program that reads a student's mark for a single subject, and prints out the corresponding grade for that mark. The mark ranges and corresponding grades are shown in the table below. You need to make sure that the mark is valid. For example, a student cannot receive -5 or 110 marks. So, the valid marks range from 0 to 100.

hint(1): you can consider the number to be an integer

hint(2): this problem can be solved in two ways: top-down (starts from A) and bottom-up (starts from F)

Marks	Grade
90 or above	A
80-89	B
70-79	C
60-69	D
50-59	E
Below 50	F

Task 14

Suppose, your friend is building an automated car called "Besla". He needs to fix the programming of the car so that it runs at a proper speed. Now, write a python program that takes 2 inputs (distance in meters and time in seconds). The program should then print the velocity in kilometers per hour of that car. Also, it should print whether the car is working properly based on the following chart.

Velocity	**Information to be printed**
Less than 60 km/h	Too slow. Needs more changes.
Between 60 km/h to 90 km/h	Velocity is okay. The car is ready!
Greater than 90 km/h	Too fast. Only a few changes should suffice.

Sample Input 1:

160000

7200

Sample Output 1:

80.0 km/h

Velocity is okay. The car is ready!

Explanation: After the conversion of distance and time, the velocity is (160/2) km/h = 80 km/h. So the velocity is okay

==

Sample Input 2:

25400

3600

Sample Output 2:

25.4 km/h

Too slow. Needs more changes.

Explanation: After the conversion of distance and time, the velocity is (25.4/1) km/h = 25.4 km/h. So the speed is too slow.

Task 15

Write a python program that takes the CGPA and no of credits completed by a student and prints whether the student is eligible for a waiver and of what percentage.

To be eligible for a waiver, a student must have completed at least 30 credits and earned a CGPA greater or equal to 3.8. If not, please print "The student is not eligible for a waiver".

CGPA	Waiver percentage
3.80 - 3.89	25 percent
3.90 - 3.94	50 percent
3.95 - 3.99	75 percent
4.00	100 percent

==

Sample Input 1:

3.93

78

Sample Output 1:

The student is eligible for a waiver of 50 percent.

==

Sample Input 2:

3.79

24

Task 16

1	`p = 5`
2	`q = 6`
3	`r = 9`
4	`sum = 0`
5	`if (p < 12):`
6	`    print(r + 2)`
7	`else:`
8	`    print(r + p)`
9	`if (q > 20):`
10	`    print(r + 19)`
11	`elif (q <= 6):`
12	`    print(q + 3)`
13	`else:`
14	`    print(p + q + r)`
15	`if (r > 15):`
16	`    print(r)`
17	`elif (r == 0):`
18	`    print(p + q)`
19	`else:`
20	`    print(p)`
21	`if (sum != 0):`
22	`    print(3)`
23	`else:`
24	`    print(sum + 32)`

25	`if (p>0 and r<10):`
26	`    print(p+r)`
27	`else:`
28	`    print(p-r)`

Output

Task 17

1	`var1 = var2 = var3 = var4 = var5 = var6 = False`
2	`result1 = False`
3	`result2 = False`
4	`result3 = False`
5	`result4 = False`
6	`result5 = False`
7	`result6 = False`
8	`result7 = False`
9	`result8 = False`
10	`result9 = False`
11	`result10 = False`
12	`var1 = 4 > 3 - 1`

13	`var2 = var1 and False`
14	`var3 = True`
15	`var4 = False`
16	`var5 = True`
17	`var6 = var3 and False`
18	`result1 = (var1 or var2) and (8 * 10 > 45)`
19	`result2 = (var1 or var2) and (result1 and False)`
20	`result3 = (var1 and result1) or result2`
21	`result4 = (var1 or var2) or ((var3 and var1) and False)`
22	`result5 = (var1 and var2) and (result3 or var1)`
23	`result6 = ((var3 or var2) and not(result5)) or True`
24	`result7 = (var4 and result1) and ((result1 and False) or True)`
25	`result8 = ((var1 and result3) and (var5 or var6)) and True`
26	`result9 = ((result2 and var2) or (result7 and var1)) and False`
27	`result10 = not(var1 and True)`

Show the values of the result variables in the above program:

result1	
result2	
result3	
result4	
result5	
result6	
result7	
result8	
result9	
result10	

Task 18

1	`var1 = False`
2	`var2 = False`
3	`var3 = False`
4	`var4 = False`
5	`var5 = False`
6	`var6 = False`
7	`result1 = False`
8	`result2 = False`
9	`result3 = False`
10	`result4 = False`
11	`result5 = False`
12	`result6 = False`
13	`result7 = False`
14	`result8 = False`
15	`result9 = False`
16	`result10 = False`
17	`var1 = ((not True) or True) and False`
18	`var2 = var1 and False`
19	`var3 = True and not False`
20	`var4 = False`
21	`var5 = True`
22	`var6 = var3 and False`
23	`result1 = (var1 and var2) and (40 % 3) > 45 or (var5 and var6)`
24	`result2 = (var1 or var2) or (result1 and False)`
25	`result3 = (var1 and result1) or result2 or var5`
26	`result4 = (var1 or var2) or ((var3 and var1) and False)`

27	`result5 = (var1 and var2) and (result3 or var1)`
28	`result6 = ((var3 or (not var2)) and (result5)) or True`
29	`result7 = (var4 and result1) and ((result1 and False) or True)`
30	`result8 = ((var1 and result3) and ((not var5) or var6)) and True`
31	`result9 = ((result2 and var2) or ((not result7) and var1)) and not False`
32	`result10 = not(var1 and True)`

Show the values of the result variables in the above program:

result1	
result2	
result3	
result4	
result5	
result6	
result7	
result8	
result9	
result10	

Task 19

1	`var1 = var2 = var3 = var4 = var5 = var6 = False`
2	`result1 = result2 = result3 = result4 = result5 = result6 = False`
3	`result7 = result8 = result9 = result10 = False`
4	`var1 = (not False or False) and True`
5	`var2 = var1 and True`
6	`var3 = False and not True`
7	`var4 = True`

8	`var5 = False`
9	`var6 = var3 and True`
10	`result1 = (var1 and var2) and ( 40 % 3 > 45) or (var5 and var6)`
11	`result2 = (var1 or var2) or (result1 and False)`
12	`result3 = (var1 and result1) or result2 or var5`
13	`result4 = (var1 or var2) or ((var3 and var1) and False)`
14	`result5 = (var1 and var2) and (result3 or var1)`
15	`result6 = ((var3 or not var2) and (result5)) or True`
16	`result7 = (var4 and result1) and ((result1 and False) or True)`
17	`result8 = ((var1 and result3) and (not var5 or var6)) and True`
18	`result9 = ((result2 and var2) or (not result7 and var1)) and not False`
19	`result10 = not (var1 and True)`

Show the values of the result variables in the above program:

result1	
result2	
result3	
result4	
result5	
result6	
result7	
result8	
result9	
result10	

Optional Tasks (20 - 23) [Ungraded]

These tasks are just for practice. No marks will be deducted for not completing them and no bonus marks will be given for solving them. Just try and practice these problems.

Task 20

Write the Python code of a program that reads an integer, and prints the integer if it is a multiple of **NEITHER 2 NOR 5.**

For example, 1, 3, 7, 9, 11, 13, 17, 19, 21, 23, 27, 29, 31, 33, 37, 39 …

==

hint(1): you may use the modulus (%) operator for checking the divisibility

hint(2): you can consider the number to be an integer

==

Sample Input 1:

3

Sample Output 1:

3

==

Sample Input 2:

19

Sample Output 2:

19

==

Sample Input 3:

5

Sample Output 3:

No

==

Sample Input 4:

12

Sample Output 4:

No

Task 21

Write the Python code of a program that reads an integer, and prints the integer if it is **NOT a multiple of 2** OR **NOT a multiple of 5.**

For example, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22\

hint(1): you may use the modulus (%) operator for checking the divisibility

hint(2): you can consider the number to be an integer

==

Sample Input 1:

3

Sample Output 1:

3

==

Sample Input 2:

15

Sample Output 2:

15

==

Sample Input 3:

20

Sample Output 3:

No

==

Sample Input 4:

14

Sample Output 4:

14

Task 22

Fiona has recently started acrylic painting and she is planning to order a few canvases and paints from an online stationery shop. The price of each 10 x 10 sized canvas is **120 tk** and the price of each 25 ml paint tube is **75 tk**. Depending on the total amount ordered from the shop, she will get some discounts. The table below shows the discount she will get on her total amount.

Total Amount (TK)	Discount (TK)

0 – 299	No Discount
300 - 499	10
500 - 749	20
750 - 999	50
>= 1000	150

Write a python program and take two inputs from the user. The first input will be the number of canvases and the second input will be the number of paint tubes ordered. Based on the price of each item, calculate the total amount that Fiona needs to pay including the discount.

==

Sample Input 1:

5

8

Sample Output 1:

Previous total: 1200

New total after discount: 1050

Explanation: 5 * 120 + 8 * 75 = 1200 Tk was her bill without discount. For 1200 Tk, the discount amount is 150 Tk. So, her new bill with a discount is (1200 - 150) = 1050 Tk.

==

Sample Input 2:

0

3

Sample Output 2:

Previous total: 225

New total after discount: 225

Explanation: 0 * 120 + 3 * 75 = 225 Tk was her bill without discount. For 225 Tk, the discount amount is 0 Tk. So, her new bill with a discount is (225 - 0) = 225 Tk.

Task 23

You are designing a robot that can calculate the temperature and guess the season. Write a Python program that takes a number as input, representing the temperature in degrees Fahrenheit, and converts it into degrees Celsius, and then prints the season based on the following table:

Temperature (degrees Celsius)	Season

Less than 20 degrees	Winter
Between 20 degrees and 25 degrees (inclusive)	Autumn
Greater than 25 degrees and less than 30 degrees	Spring
Greater than or equal to 30 degrees	Summer

==

Use the following formula to convert the temperature:

(degrees Celsius) = ((degrees Fahrenheit) - 32) * 0.56

==

Sample Input 1:

82

Sample Output 1:

28 degrees C

Spring

Explanation: The temperature in Celsius is (82 - 32) * 0.56 = 28 degrees, which is printed. This is between 25 and 30 degrees, so "Spring" is printed after that.

==

Sample Input 2:

32

Sample Output 2:

0 degrees C

Winter

Explanation: The temperature in Celsius is (32 - 32) * 0.56 = 0 degrees, which is printed. This is less than 20 degrees, so "Winter" is printed after that.

==

Sample Input 3:

76

Sample Output 3:

24.64 degrees C

Autumn

Explanation: The temperature in Celsius is (76 - 32) * 0.56 = 24.64 degrees, which is printed. This is between 20 degrees and 25 degrees (inclusive), so "Autumn" is printed after that.

==

Sample Input 4:

77

Sample Output 3:

25.2 degrees C

Spring

Explanation: The temperature in Celsius is (77 - 32) * 0.56 = 25.2 degrees, which is printed. This is greater than 25 degrees and less than 30 degrees, so "Spring" is printed after that.