



Inspiring Excellence

Course Title: Programming Language I

Course Code: CSE 110

Assignment no: 2

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| Class Tasks | 7 |
| Evaluation Tasks | 3 |
| Home Tasks | 8 |
| Total | 18 |

Class Task 1

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 | Sample Output |
|--------------|--------------------|
| 7 | The number is odd |
| 10 | The number is even |
| -44 | The number is even |

Class Task 2

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 | Sample Output |
|--------------|-----------------------|
| 7 3 | First is greater |
| -33 3 | Second is greater |
| 11 11 | The numbers are equal |

Class Task 3

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 | Sample Output |
|--------------|--------------------------|
| 5 | 5 |
| 10 | 10 |
| 3 | Not a multiple of 2 OR 5 |

Class Task 4

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 | Sample Output |
|--------------|------------------------------|
| 30 | 30 |
| 15 | Not multiple of 2 and 5 both |
| 6 | Not multiple of 2 and 5 both |

Class Task 5

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 |

Now let's look at the samples.

| Sample Input | Sample Output |
|--------------|--|
| 3.93 78 | The student is eligible for a waiver of 50 percent |
| 3.79 24 | The student is not eligible for a waiver |

Class Task 6

What will be the output of the following program? Your answer will not be accepted without the workings.

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

| | |
|----|---|
| 23 | <code>else:</code> |
| 24 | <code> print(sum + 32)</code> |
| 25 | <code>if (p > 0 and r < 10):</code> |
| 26 | <code> print(p + r)</code> |
| 27 | <code>else:</code> |
| 28 | <code> print(p - r)</code> |

| Output |
|--------|
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| |
| |
| |
| |

Class Task 7

What will be the values of result1 to result5 after running the following program? Your answer will not be accepted without the workings.

| | |
|---|---|
| 1 | <code>var1 = var2 = True</code> |
| 2 | <code>var3 = var4 = var5 = False</code> |
| 3 | <code>result1 = result2 = result3 = True</code> |
| 4 | <code>result4 = result5 = False</code> |
| 5 | <code>var1 = 4 > 3 - 1</code> |
| 6 | <code>var2 = False and var1</code> |
| 7 | <code>var3 = True</code> |
| 8 | <code>var4 = False</code> |
| 9 | <code>var5 = not(var3 or var4)</code> |

| | |
|----|---|
| 10 | <code>result1 = (var1 or var2) and (8 * 10 > 45)</code> |
| 11 | <code>result2 = (var1 or var2) and (result1 and False)</code> |
| 12 | <code>result3 = (var1 and not result1) or result2</code> |
| 13 | <code>result4 = (var1 or var2) or not((var5 and var1) and False)</code> |
| 14 | <code>result5 = (not var1 and var4) and (result3 or var3)</code> |

Output:

| | |
|----------------------|--|
| <code>result1</code> | |
| <code>result2</code> | |
| <code>result3</code> | |
| <code>result4</code> | |
| <code>result5</code> | |

Class Evaluation Task 1

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 | Sample Output | Explanation |
|--------------|---|--|
| 100 | 26000 | Since, the number of hours worked is $100 > 40$, therefore $\text{salary} = 8000 + (100 - 40) * 300 = 26000$ |
| 30 | 6000 | Since, the number of hours worked is $30 < 40$, therefore $\text{salary} = 30 * 200 = 6000$ |
| -30 | Hour cannot be negative | Invalid input, because hours should always be greater than or equal to zero |
| 170 | Impossible to work more than 168 hours weekly | Invalid input, because the valid work hour range is 0 to 168 |

Class Evaluation Task 2

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): **This is not a branching problem.** We may consider our user input to be an integer value and use just // and % operators to solve the problem*

hint(2): 1 hour = 60 minutes = 3600 seconds and 1 minute = 60 seconds

| Sample Input | Sample Output | Explanation |
|--------------|--|---|
| 10000 | Hours: 2 Minutes: 46 Seconds: 40 | $10000 // 3600 = \mathbf{2 \text{ hours}}$ and $10000 \% 3600 = 2800$ (<i>remaining seconds</i>) Then again, $2800 // 60 = \mathbf{46 \text{ minutes}}$ and $2800 \% 60 = \mathbf{40 \text{ seconds}}$ And hence we have arrived at our answer. |
| 500 | Hours: 0 Minutes: 8 Seconds: 20 | $500 // 3600 = \mathbf{0 \text{ hours}}$ and $500 \% 3600 = 500$ (<i>remaining seconds</i>) Then again, $500 // 60 = \mathbf{8 \text{ minutes}}$ and $500 \% 60 = \mathbf{20 \text{ seconds}}$ |

Class Evaluation Task 3

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. It 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. |

Now let’s look at the samples.

| Sample Input | Sample Output | Explanation |
|----------------|--|---|
| 160000 7200 | 80.0 km/h Velocity is okay. The car is ready! | After the conversion of distance and time, the velocity is $(160/2)$ km/h = 80 km/h. So, the velocity is okay. |
| 25400 3600 | 25.4 km/h Too slow. It needs more changes. | 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. |

Home Task 1

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 | Sample Output | Explanation |
|--------------|---------------|---|
| -40 -4 | 36 | $-4 > -40$, so $-4 - (-40) = -4 + 40 = 36$ |
| 6 2 | 4 | $6 > 2$, so $6 - 2 = 4$ |
| 5 5 | 0 | 5 is not greater than 5, so $5 - 5 = 0$ |

Home Task 2

Write the Python code of a program that reads an integer, and prints the integer if 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 | Sample Output |
|--------------|--------------------------|
| 6 | 6 |
| 15 | 15 |
| 10 | Multiple of 2 and 5 both |
| 17 | Not a multiple we want |

Home Task 3

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

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

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

*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 | Sample Output | Explanation |
|--------------|--------------------|---|
| 120 | 2416.2162162162163 | Since S (user input) given here is $120 \geq 100$, so $L = 12000 / (4 + (120 * 120)/14900) = 2416.2162162162163$ |
| 3 | 1875 | Since S (user input) given here is $3 < 100$, so $L = 3000 - 125 * 3 * 3 = 1875$ |

Home Task 4

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.

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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"

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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".

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

Home Task 5

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 |

Home Task 6

What will be the output of the following program? Show the workings.

| | |
|----|--|
| 1 | <code>num1 = 10</code> |
| 2 | <code>num2 = -3</code> |
| 3 | <code>num3 = -1</code> |
| 4 | <code>sum = num1 + num2 + num3</code> |
| 5 | <code>if (num3 < 0):</code> |
| 6 | <code> print(num3 * -2)</code> |
| 7 | <code>else:</code> |
| 8 | <code> print(sum)</code> |
| 9 | <code>if (num1 < 5):</code> |
| 10 | <code> print(num1 + 10)</code> |
| 11 | <code>elif (num2 == -3):</code> |
| 12 | <code> num2 = num1</code> |
| 13 | <code> print(num2)</code> |
| 14 | <code>else:</code> |
| 15 | <code> print(num1 + num2 + num3)</code> |
| 16 | <code>if (num1 > 15):</code> |
| 17 | <code> print(num1)</code> |
| 18 | <code>elif (num2 == 0):</code> |
| 19 | <code> print(num2 + num3)</code> |
| 20 | <code>else:</code> |
| 21 | <code> print(num3)</code> |
| 22 | <code>if (sum != 0):</code> |
| 23 | <code> print(100)</code> |

| | |
|----|--|
| 24 | <code>else:</code> |
| 25 | <code> print(sum + 100)</code> |
| 26 | <code>if (num1 > 0 and num2 < 0):</code> |
| 27 | <code> print(num1 == num2)</code> |
| 28 | <code>else:</code> |
| 29 | <code> print("False")</code> |

| Output |
|--------|
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| |

Home Task 7

What will be the values of result1 to result10 after running the following program? Your answer will not be accepted without the workings.

| | |
|----|------------------------------|
| 1 | <code>var1 = False</code> |
| 2 | <code>var2 = False</code> |
| 3 | <code>var3 = False</code> |
| 4 | <code>var4 = False</code> |
| 5 | <code>var5 = False</code> |
| 6 | <code>var6 = False</code> |
| 7 | <code>result1 = False</code> |
| 8 | <code>result2 = False</code> |
| 9 | <code>result3 = False</code> |
| 10 | <code>result4 = False</code> |

| | |
|----|---|
| 11 | <code>result5 = False</code> |
| 12 | <code>result6 = False</code> |
| 13 | <code>result7 = False</code> |
| 14 | <code>result8 = False</code> |
| 15 | <code>result9 = False</code> |
| 16 | <code>result10 = False</code> |
| 17 | <code>var1 = ((not True) or True) and False</code> |
| 18 | <code>var2 = var1 and False</code> |
| 19 | <code>var3 = True and not False</code> |
| 20 | <code>var4 = False</code> |
| 21 | <code>var5 = True</code> |
| 22 | <code>var6 = var3 and False</code> |
| 23 | <code>result1 = (var1 and var2) and (40 % 3) > 45 or (var5 and var6)</code> |
| 24 | <code>result2 = (var1 or var2) or (result1 and False)</code> |
| 25 | <code>result3 = (var1 and result1) or result2 or var5</code> |
| 26 | <code>result4 = (var1 or var2) or ((var3 and var1) and False)</code> |
| 27 | <code>result5 = (var1 and var2) and (result3 or var1)</code> |
| 28 | <code>result6 = ((var3 or (not var2)) and (result5)) or True</code> |
| 29 | <code>result7 = (var4 and result1) and ((result1 and False) or True)</code> |
| 30 | <code>result8 = ((var1 and result3) and ((not var5) or var6)) and True</code> |
| 31 | <code>result9 = ((result2 and var2) or ((not result7) and var1)) and not False</code> |
| 32 | <code>result10 = not(var1 and True)</code> |

Output:

| | |
|---------|--|
| result1 | |
| result2 | |

| | |
|----------|--|
| result3 | |
| result4 | |
| result5 | |
| result6 | |
| result7 | |
| result8 | |
| result9 | |
| result10 | |

Home Task 8

What will be the values of result1 to result10 after running the following program? Your answer will not be accepted without the workings.

| | |
|----|---|
| 1 | <code>var1 = var2 = var3 = var4 = var5 = var6 = False</code> |
| 2 | <code>result1 = result2 = result3 = result4 = result5 = result6 = False</code> |
| 3 | <code>result7 = result8 = result9 = result10 = False</code> |
| 4 | <code>var1 = (not False or False) and True</code> |
| 5 | <code>var2 = var1 and True</code> |
| 6 | <code>var3 = False and not True</code> |
| 7 | <code>var4 = True</code> |
| 8 | <code>var5 = False</code> |
| 9 | <code>var6 = var3 and True</code> |
| 10 | <code>result1 = (var1 and var2) and (40 % 3 > 45) or (var5 and var6)</code> |
| 11 | <code>result2 = (var1 or var2) or (result1 and False)</code> |
| 12 | <code>result3 = (var1 and result1) or result2 or var5</code> |
| 13 | <code>result4 = (var1 or var2) or ((var3 and var1) and False)</code> |
| 14 | <code>result5 = (var1 and var2) and (result3 or var1)</code> |

| | |
|----|---|
| 15 | <code>result6 = ((var3 or not var2) and (result5)) or True</code> |
| 16 | <code>result7 = (var4 and result1) and ((result1 and False) or True)</code> |
| 17 | <code>result8 = ((var1 and result3) and (not var5 or var6)) and True</code> |
| 18 | <code>result9 = ((result2 and var2) or (not result7 and var1)) and not False</code> |
| 19 | <code>result10 = not (var1 and True)</code> |

Output:

| | |
|-----------------------|--|
| <code>result1</code> | |
| <code>result2</code> | |
| <code>result3</code> | |
| <code>result4</code> | |
| <code>result5</code> | |
| <code>result6</code> | |
| <code>result7</code> | |
| <code>result8</code> | |
| <code>result9</code> | |
| <code>result10</code> | |

Next lab

Iteration