

# 4CS001 – Introductory Programming & Problem Solving Workshop 2

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**Week:**2

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1. What is the intuition behind assigning a value to a variable in python?

Ans: The intuition behind assigning a value to a variable in python is to store values.

2. What are some common data types in Python, and when would you use each one?

Ans: Some common data types in Python are:

Numeric data types - numbers, integers, floating numbers

String data types - for text

Sequence type - for list, range

Boolean type - true, false

3. Discuss the differences between mutable and immutable data types and give an example of each.

Ans: The differences between mutable and immutable data types are:

S.N	Mutable data types	Immutable data types
1.	Fields can be modified after the object creation.	Fields cannot be modified after object creation.
2.	Has getter and setter methods.	Has only getter methods
3.	They are not final.	They are final.
4.	For example:user defined classes, lists, dicts, etc.	For example:int, float, string, unicode, etc.

4. Python is a dynamically typed language. What does this statement mean?

Ans:Python is a dynamically typed language. This statement means that variables has the ability to assign values of different type at different times during execution.

## PART 2

1. Evaluate the following Boolean expressions in **IDLE**:

**Note down the response to each. Do they differ from what you would expect?**

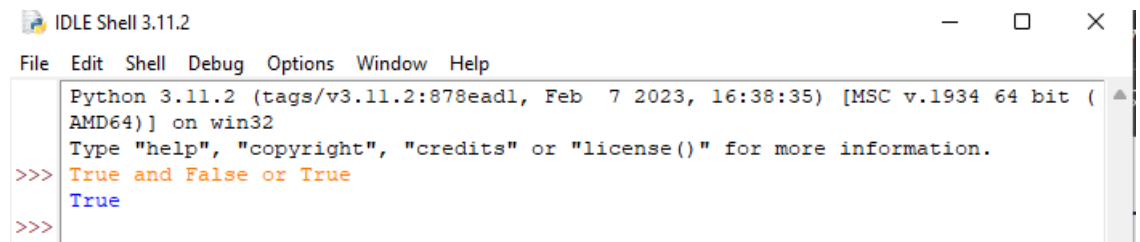
*A. True and True*

**Source Code:**

```
Python 3.7.5 (tags/v3.7.5:5c02a39a0b, Oct 15 2019, 10:15:00) [AMD64] on win32
Type "help", "copyright", "credits" or "license()" for more
>>> true and true
Traceback (most recent call last):
  File "<pyshell#0>", line 1, in <module>
    true and true
NameError: name 'true' is not defined
>>> True and True
True
>>> |
```

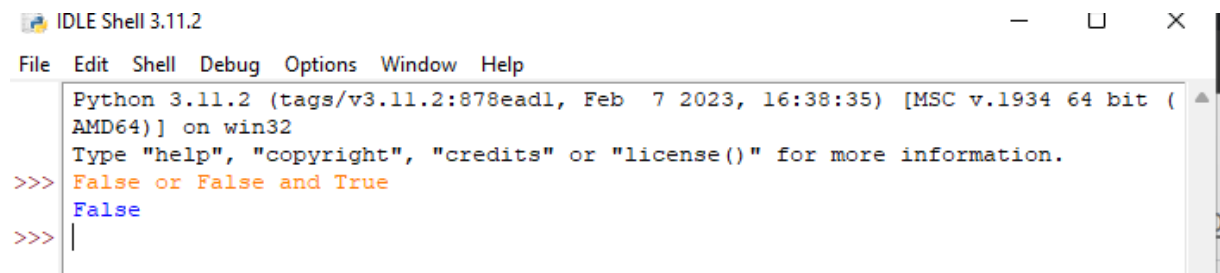
**Output:**

*B. True and False or True*



```
IDLE Shell 3.11.2
File Edit Shell Debug Options Window Help
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> True and False or True
True
>>> |
```

*C. False or False and True*



```
IDLE Shell 3.11.2
File Edit Shell Debug Options Window Help
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> False or False and True
False
>>> |
```

*D. False or 0*

```
IDLE Shell 3.11.2
File Edit Shell Debug Options Window Help
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> False or 0
0
```

### E. not (False) and True

```
IDLE Shell 3.11.2
File Edit Shell Debug Options Window Help
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> not(False) and True
True
>>> |
```

### F. not (True or not (False and False))

```
IDLE Shell 3.11.2
File Edit Shell Debug Options Window Help
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> not(True or not (False and False))
False
|
```

2. Write a python program to prompt the user for input number and print square of that integer.

Ans:

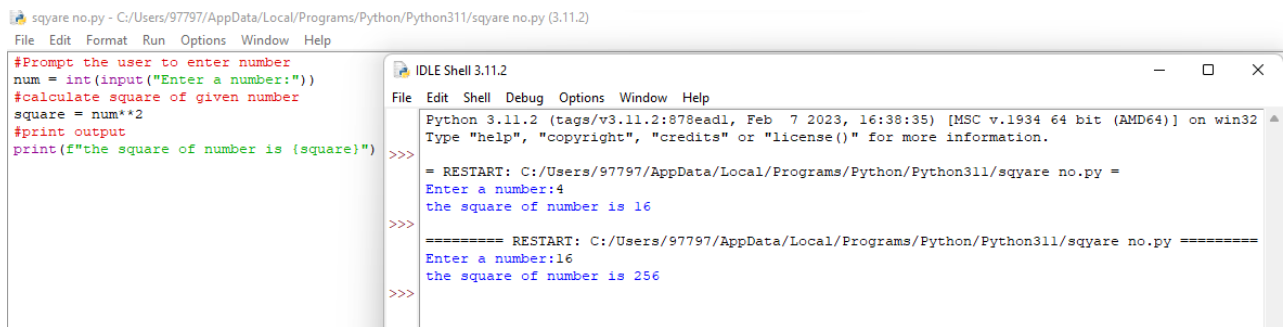
Source code with output

```
sqare.py - C:/Users/97797/AppData/Local/Programs/Python/Python311/sqare.py (3.11.2)
File Edit Format Run Options Window Help
#prompt the user to input number
n = int(input("Enter a number:"))
#calculating square
square = n**2
#Print result
print("the square of a number is:", square)
```

```
IDLE Shell 3.11.2
File Edit Shell Debug Options Window Help
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
=== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/sqare.py ===
Enter a number:140
the square of a number is: 19600
>>>
= RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/sqare.py
Enter a number:950
the square of a number is: 902500
>>> |
```

3. Write a python program to calculate a simple interest rate.

Ans: Source code with output



The screenshot shows the Python IDLE Shell interface. The left pane displays the source code for a file named 'sqare no.py'. The code prompts the user to enter a number, calculates its square, and prints the result. The right pane shows the shell's output, including a restart message and the execution results for two different inputs: 4 and 16.

```
#Prompt the user to enter number
num = int(input("Enter a number:"))
#calculate square of given number
square = num**2
#print output
print(f"the square of number is {square}")
```

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>> = RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/sqare no.py =
Enter a number:4
the square of number is 16

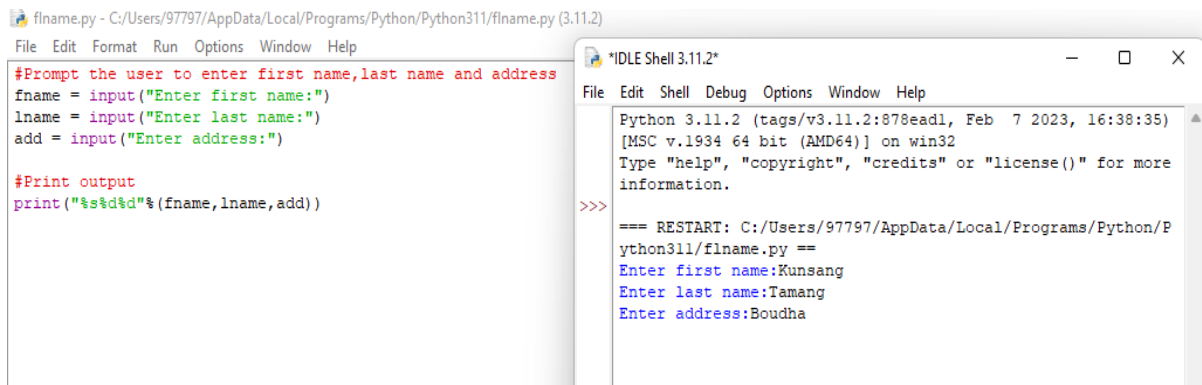
>>>

===== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/sqare no.py =====
Enter a number:16
the square of number is 256

>>>
```

4. Write a python program to input first name, last name, and address. Print them.

Ans: Source code with output



The screenshot shows the Python IDLE Shell interface. The left pane displays the source code for a file named 'fname.py'. The code prompts the user to enter their first name, last name, and address, and then prints them. The right pane shows the shell's output, including a restart message and the execution results for the inputs 'Kunsang', 'Tamang', and 'Boudha'.

```
#Prompt the user to enter first name,last name and address
fname = input("Enter first name:")
lname = input("Enter last name:")
add = input("Enter address:")

#Print output
print("%s%s%d"% (fname,lname,add))
```

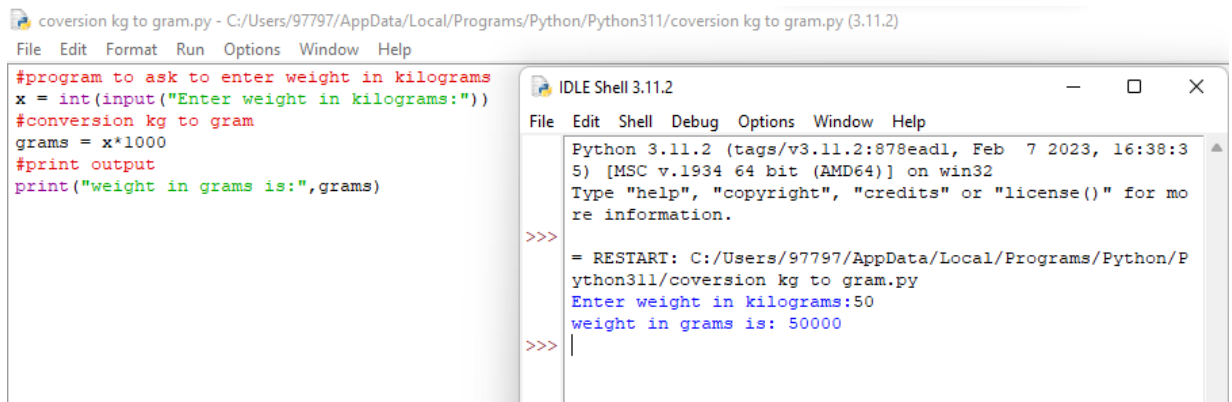
```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35)
[MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more
information.

>>>

=== RESTART: C:/Users/97797/AppData/Local/Programs/Python/P
ython311/fname.py ==
Enter first name:Kunsang
Enter last name:Tamang
Enter address:Boudha
```

5. Write a python program to ask in kilograms and convert into grams

Ans: Source code with output



The screenshot shows a Python IDE with two windows. The left window is a text editor titled 'conversion kg to gram.py' containing the following code:

```
#program to ask to enter weight in kilograms
x = int(input("Enter weight in kilograms:"))
#conversion kg to gram
grams = x*1000
#print output
print("weight in grams is:",grams)
```

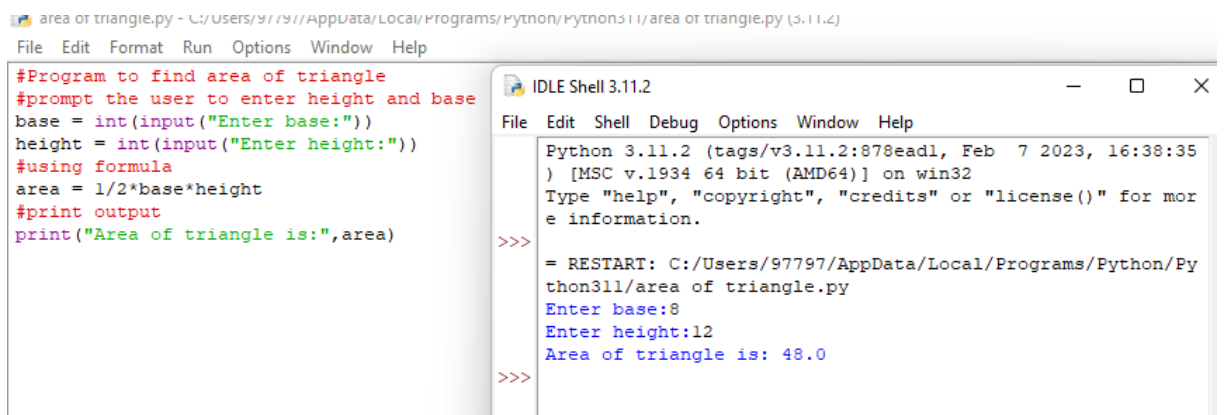
The right window is the 'IDLE Shell 3.11.2' showing the execution output:

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>>
= RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/coversion kg to gram.py
Enter weight in kilograms:50
weight in grams is: 50000
>>>
```

6. Write a python program to display the area of the triangle, (take user input).

Ans: Source code with output



The screenshot shows a Python IDE with two windows. The left window is a text editor titled 'area of triangle.py' containing the following code:

```
#Program to find area of triangle
#prompt the user to enter height and base
base = int(input("Enter base:"))
height = int(input("Enter height:"))
#using formula
area = 1/2*base*height
#print output
print("Area of triangle is:",area)
```

The right window is the 'IDLE Shell 3.11.2' showing the execution output:

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>>
= RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/area of triangle.py
Enter base:8
Enter height:12
Area of triangle is: 48.0
>>>
```

7. Write a python program to prompt user to input their name and print like

Ans: Source code with output

The screenshot shows the Python IDLE environment. The left pane contains a file named `name.py` with the following code:

```
#prompt user to enter name
name = input("Enter name:")
#print output
print("hello",name)
```

The right pane shows the IDLE Shell (Python 3.11.2) with the following output:

```
>>>
==== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/name.py ====
Enter name:Kunsang
hello Kunsang
>>>
```

## PART 3

1. Write a python program to find the remainder of a given number if divisor is 2.

Ans:

Source code with output

The screenshot shows the Python IDLE environment. The left pane contains a file named `remainder1.py` with the following code:

```
#prompt the user to enter number
num = int(input("Enter a number:"))

#calculating remainder
remainder = num%2

#print output
print("remainder of a number is:", remainder)
```

The right pane shows the IDLE Shell (Python 3.11.2) with the following output:

```
>>>
= RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/remainder1.py
Enter a number:100
remainder of a number is: 0
>>>
= RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/remainder1.py
Enter a number:67
remainder of a number is: 1
>>>
```

2. Write a python program to calculate BMI of a person when all parameters are provided. **BMI= weight(kg)/height(m^2)**

Ans:

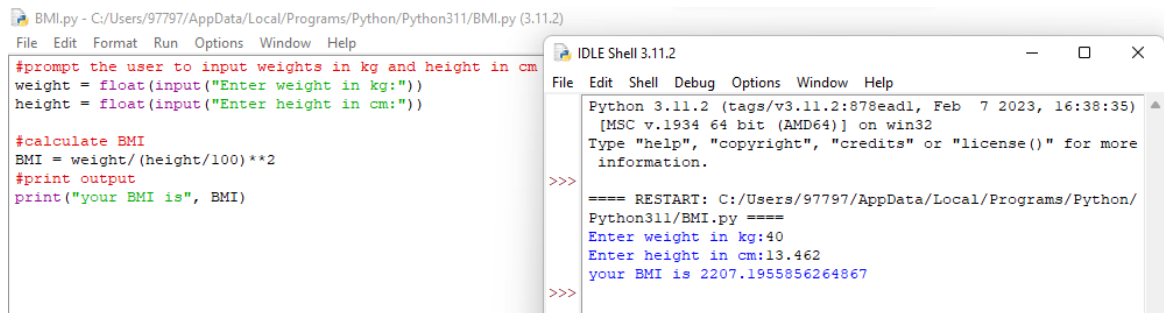
### Simple Logic

- Asks to input the user's weight in kilograms.
- Asks to input the user's height in centimeters.
- Calculates the BMI (Body Mass Index).

[BMI=weight in kilograms / square of height in centimeters]

Prints the user's BMI.

Ans:



The screenshot shows a Python IDE with two windows. The left window, titled 'BMI.py', contains the following code:

```
#prompt the user to input weights in kg and height in cm
weight = float(input("Enter weight in kg:"))
height = float(input("Enter height in cm:"))

#calculate BMI
BMI = weight/(height/100)**2
#print output
print("your BMI is", BMI)
```

The right window, titled 'IDLE Shell 3.11.2', shows the program's execution output:

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35)
[MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more
information.

>>>
==== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/BMI.py ====
Enter weight in kg:40
Enter height in cm:13.462
your BMI is 2207.1955856264867
>>>
```

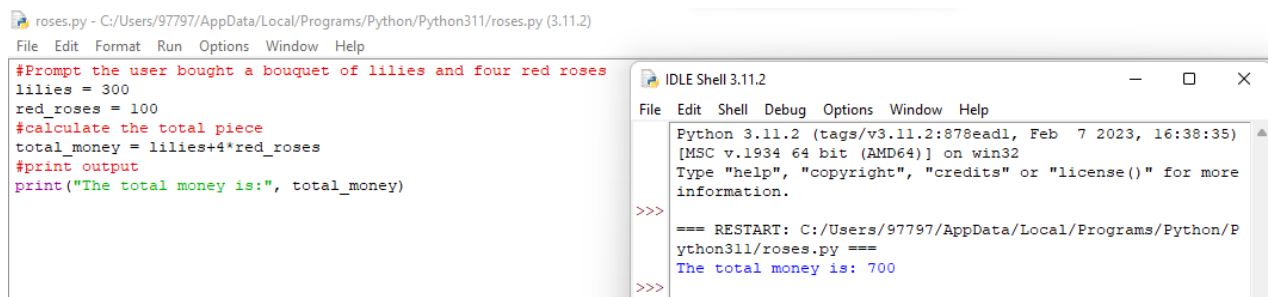
3. A costumer walks in a flower shop and finds the following menu:

Particular s	White Roses	Lilies	Poppies	Marigold	Red Roses
Per piece	50	50	40	20	100
Per bouquet	300	300	250	200	1000

*If the user bought a bouquet of lilies and four red roses, find the total money the user spent in the flower shop.*

Ans:

Source code with output



The screenshot shows a Python IDE with two windows. The left window, titled 'roses.py', contains the following code:

```
#Prompt the user bought a bouquet of lilies and four red roses
lilies = 300
red_roses = 100
#calculate the total piece
total_money = lilies+4*red_roses
#print output
print("The total money is:", total_money)
```

The right window, titled 'IDLE Shell 3.11.2', shows the program's execution output:

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35)
[MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more
information.

>>>
==== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/roses.py ====
The total money is: 700
>>>
```

3. Write a python program to display the total surface area of the hemisphere.

Ans:

Source code with output



The screenshot shows a Python IDLE window with a file named TSA.py. The code prompts the user for a radius, calculates the surface area of a hemisphere (TSA), and prints the result. The output window shows the program running successfully with an input radius of 4, resulting in a TSA of 150.72.

```
#prompt the user to enter radius
r = int(input("Enter radius of hemisphere:"))
pie = 3.14
#applying formula
area = 3*pie*r**2
#print the result
print("TSA of hemisphere is :", area)
```

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>>
==== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/TSA.py ====
Enter radius of hemisphere:4
TSA of hemisphere is : 150.72
>>>
```

4. Write a program to find the cube root of a number. Prompt the user to input a number and print the cube root of the number.

Ans: Source code with output

The screenshot shows a Python IDLE window with a file named cuberoot.py. The code prompts the user for a number, calculates its cube root, and prints the result. The output window shows the program running successfully with an input number of 9, resulting in a cube root of approximately 2.08.

```
#prompt the user to enter a number
num = int(input("Enter a number:"))
#calculate cube root
cube = num**(1/3)
#print result
print("cube root of number is :",cube)
```

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>>
== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/cuberoot.py ==
Enter a number:9
cube root of number is : 2.080083823051904
>>>
```

5. Suppose you are a teacher, and you want to create a program that takes in grades from three exams and calculates the average grade for a student. (Print out the average.)

Ans: Source code with output

The screenshot shows a Python IDLE window with a file named avg.py. The code prompts the user for grades in three subjects, calculates the average, and prints the result. The output window shows the program running successfully with input grades of 45, 75, and 90, resulting in an average grade of 70.0.

```
#prompt the user to input grade marks of three subject
a = int(input("Enter grade in first subject:"))
b = int(input("Enter grade in second subject:"))
c = int(input("Enter grade in third subject:"))

#calculating average
Average = (a+b+c)/3

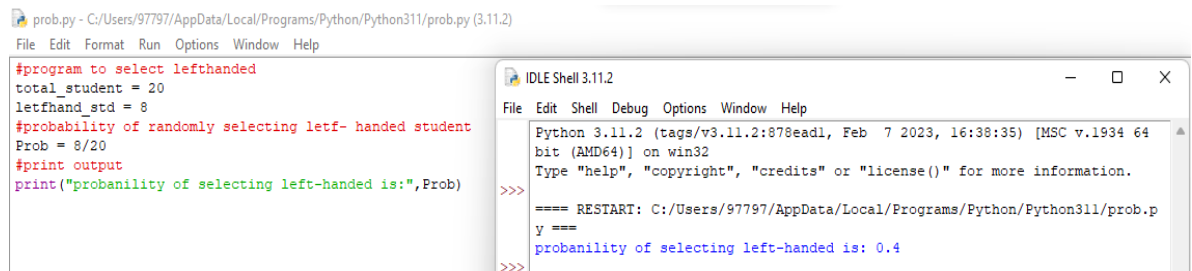
#print the result
print(f"the average grade is {Average}")
```

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.

>>>
==== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/avg.py ====
Enter grade in first subject:45
Enter grade in second subject:75
Enter grade in third subject:90
the average grade is 70.0
>>>
```

6. Suppose there are 20 students in a class and 8 of them are left-handed. What is the probability of randomly selecting a left-handed student from the class?

Ans: Source code with output



The screenshot shows a Python IDE window titled 'prob.py - C:/Users/97797/AppData/Local/Programs/Python/Python311/prob.py (3.11.2)'. The code defines variables for a probability problem and prints the result. The output window shows the execution result.

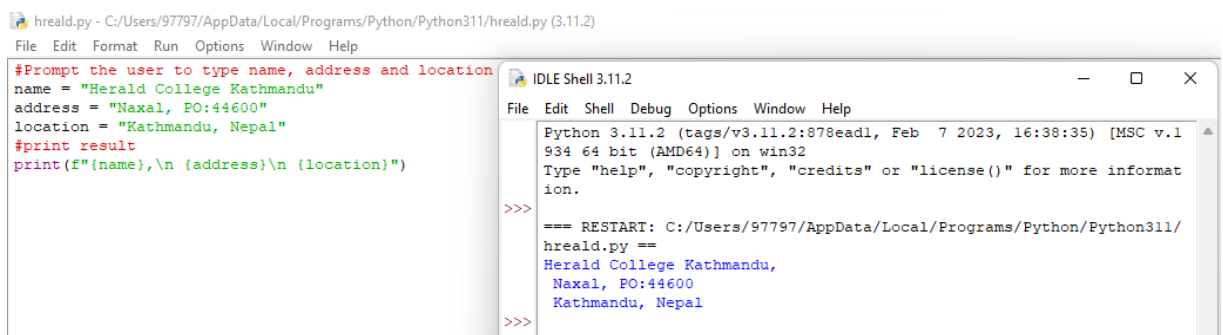
```
#program to select lefthanded
total_student = 20
letfhand_std = 8
#probability of randomly selecting letf- handed student
Prob = 8/20
#print output
print("probanility of selecting left-handed is:",Prob)
```

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1934 64
bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
==== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/prob.p
y ====
probanility of selecting left-handed is: 0.4
>>>
```

7. Write a python program to print this address as it is.

*Herald College Kathmandu,  
Naxal, PO:44600  
Kathmandu, Nepal*

Ans: Source code with output



The screenshot shows a Python IDE window titled 'hreald.py - C:/Users/97797/AppData/Local/Programs/Python/Python311/hreald.py (3.11.2)'. The code prompts the user to enter name, address, and location, then prints them. The output window shows the execution result.

```
#Prompt the user to type name, address and location
name = "Herald College Kathmandu"
address = "Naxal, PO:44600"
location = "Kathmandu, Nepal"
#print result
print(f"{name},\n {address}\n {location}")
```

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [MSC v.1
934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more informat
ion.
>>>
==== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Python311/
hreald.py ====
Herald College Kathmandu,
Naxal, PO:44600
Kathmandu, Nepal
>>>
```

## PART 4 (Home Task – Case Study Based)

1. You're waiting at a station and the announcer has just broadcast that your train is going to be 13445 seconds late. You need to work out in understandable terms what that means. You assume this is going to be quite a long time so you whip out your laptop to write a program to convert the seconds into hours, minutes, and seconds, aiming to maximize readability by giving priority to the largest units, i.e. the resulting seconds and minutes values must not be greater than 60.

**You will need four variables to hold:**

- the total number of seconds.
- the number of hours; the number of minutes.

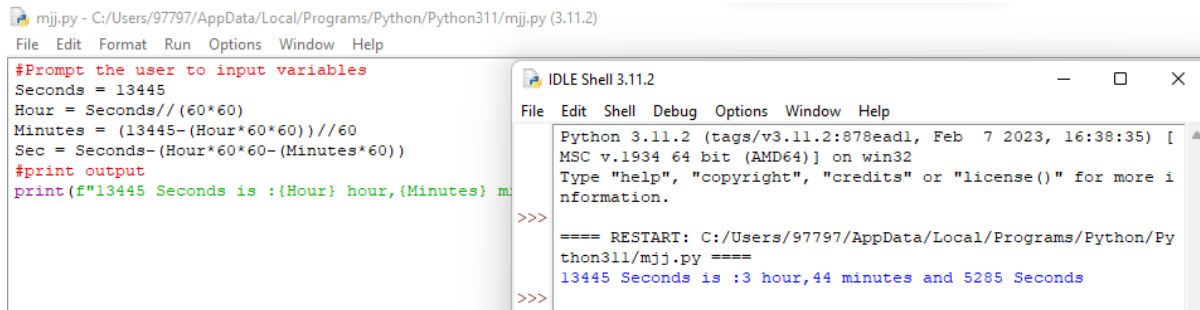
- and the number of remaining seconds.

The example output should look something like this:

**13442 Seconds is: 3 Hours, 44 Minutes, and 5 Seconds.**

**Ans:**

**Source code with output**



The screenshot displays the Python IDLE Shell interface. The left pane shows the source code for a script named 'mjj.py'. The code defines 'Seconds = 13445', calculates 'Hour' as the integer division of 'Seconds' by 3600, 'Minutes' as the integer division of the remainder by 60, and 'Sec' as the remaining seconds. It then prints the result in a formatted string. The right pane shows the shell's output, which includes a restart message and the final formatted output: '13445 Seconds is :3 hour,44 minutes and 5285 Seconds'.

```
mjj.py - C:/Users/97797/AppData/Local/Programs/Python/Python311/mjj.py (3.11.2)
File Edit Format Run Options Window Help

#Prompt the user to input variables
Seconds = 13445
Hour = Seconds//(60*60)
Minutes = (13445-(Hour*60*60))/60
Sec = Seconds-(Hour*60*60-(Minutes*60))
#print output
print(f"13445 Seconds is :{Hour} hour,{Minutes} m

IDLE Shell 3.11.2
File Edit Shell Debug Options Window Help

Python 3.11.2 (tags/v3.11.2:878ead1, Feb 7 2023, 16:38:35) [
MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more i
nformation.

>>>
==== RESTART: C:/Users/97797/AppData/Local/Programs/Python/Py
thon311/mjj.py ====
13445 Seconds is :3 hour,44 minutes and 5285 Seconds
>>>
```