

Python

Module 1 Lesson 7 and Lesson 8



Name: _____

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Recap:

1. Functions:

a. Defining a function

- Recap – Program is the “umbrella” of a code
- Recall - Functions are inside the program. It is a repeated action. Function allow you to cut down the repetition. Eg. Packing your bag. You need to pack your bag every day. However, you pack different books for different days

b. Calling functions

- Recap – You can define a function and not call it.
- Recap – Define functions at the start of the code before calling it
- Recap – Functions will be executed only when you call it. This is when the program starts

c. Arguments

d. Output of a function

Learning Outcomes:

1. Local vs Global variables

- Highlight how the different variables interact within and outside the functions
- Highlight the 2 ways of defining a Global variable
- Manipulate the global variable within a function
- Understand how to apply local and global variables in their codes

Explanation Points:

- Highlight the importance of Functions
 - Different way of handling functions as compared to variables
- The importance of Global Variables in functions
 - How does Global Variables affect other functions/codes
- How forgetting local variables will be useful in future codes

Breakdown of Lesson Plan:

Recap Lesson 5 Quiz <ul style="list-style-type: none">• No help provided. Student must write answer first before being allowed to try typing on computer• This quiz is quite time consuming. It covers all the basic information of the earlier lessons.• Student should score at least 75%	15 min (Test) 5 min (Explanation)
Lesson 7.1 (Local VS Global Variables)	15 min
Lesson 7.2 (Global Variables)	15 min
Lesson 8.1 (Application of Local and Global Variables)	15 min
Lesson 8 Quiz	25 min

**Note: There is a high chance of student not being able to complete on time.*

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Recap Lesson 5 Quiz

Question 1

Define a function that adds 2 numbers together. Using your function, add the following pairs of numbers together, and output the answer in the following format:

“The sum of ___ and ___ is ___.”

1 and 2

15 and 29

94 and 217

1957 and 2406

Question 2

John is given \$200 to spend. He has created 4 wish lists and wants to know how much money he would have left if he were to spend his money on each list. Help him write a function that tells him how much money he would have left. Your answer should be in the format:

“In List ___, John will have \$___ left.”

List A: \$50 on food, \$30 on games, \$100 on books

List B: \$72 on food, \$29 on games, \$68 on books

List C: \$43 on food, \$75 on games, \$29 on books

List D: \$67.40 on food, \$79.20 on games, \$21.10 on books

Question 3

In School A, there are 4 classes. In each class, there are 40 students. From the school database, Jacob managed to find the percentage of boys in each class. Write a function that prints the number of girls in each class. Your answer should be in the format:

“Class ___ has ___ girls.”

Class A: 30% boys

Class B: 25% boys

Class C: 47.5% boys

Class D: 57.5 % boys

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Lesson 7.1

Recap : Python calling function and sequence syntax:

Calling side - Argument

Function side – Parameter

	Definition	Parameter
1	def name(firstandlast):	
2	print(firstandlast)	
3		
4	name("Jack Lim")	
5	name("Joe Tan")	

1	Jack Lim
2	Joe Tan

Python Reading Sequence – Line 1,4,1,2,5,1,2

The scope of variables can be defined by the place where the variables have declared. Variables can be defined with two types of scope.

1. Local Variable

- The local variables are defined inside the function, hence local variables can be accessed only inside the function.
- Local variables can only be reached in their scope.

The example below has local variable – z. The function is called

1	def sum(x,y):
2	z=x+y
3	print(z)
4	
5	sum(8,6)

z is the local variable – inside the function

Calling the function named sum – it executes the function (lines 1 to 3)

Output

1	14
---	----

What is the python reading sequence? Fill in the output

1	def f(var=1,var2=7):
2	var2=9
3	var1=3
4	print(var1," ", var2)
5	f(10,12)

Output

1	
---	--

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Lesson 7.1

2. Global Variable

- a. The global variables are defined outside the function, hence global variables can be accessed throughout the program – inside functions or outside functions

The example below has 1 global variable – **f=10** and 1 local variable – **a**. The function is called

1	f=10	f is the global variable – outside the function	Output <table> <tr> <td>1</td> <td>15</td> </tr> </table>	1	15
1	15				
2	def sum(x,y):				
3	a=f+x+y	a is the local variable – inside the function			
4	print(a)				
5		Calling the function named sum – it executes the function (lines 2 to 4)			
6	sum(3,2)				

The example below has 1 global variable – **f=10** and 1 local variable - **a**. The function is not called

1	f=10	f is the global variable – outside the function	Output <table> <tr> <td>1</td> <td>10</td> </tr> <tr> <td>2</td> <td>NameError</td> </tr> </table>	1	10	2	NameError
1	10						
2	NameError						
2	def sum(x,y):						
3	a=f+x+y	a is the local variable – inside the function					
4	print(a)						
5							
6	print(f)	Printing f will result in 10 because f=10 is a global variable					
7	print(a)	The function named sum is not called – it will not execute the function (lines 2 to 4). Printing a – local variable, will result in an error					

The example below has 1 global variable – **f=10** and 1 local variable - **a**. The function is called

1	f=10	f is the global variable – outside the function	Output <table border="1"> <tr> <td>1</td> <td>10</td> </tr> <tr> <td>2</td> <td>15</td> </tr> </table>	1	10	2	15
1	10						
2	15						
2	def sum(x,y):						
3	a=f+x+y	a is the local variable – inside the function					
4	print(a)						
5							
6	print(f)	Printing f will result in 10 because f=10 is a global variable					
7	sum(3,2)	The function named sum is called – it will execute the function (lines 2 to 4).					

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Lesson 7.1

The example below has 1 global variable – **f=10** and 1 local variable - **a**. The function is called

Output

1	f=10
2	def sum(x,y):
3	a=f+x+y
4	print(a)
5	
6	print(f)
7	sum(3,2)
8	print(a)

f is the global variable – outside the function

a is the local variable – inside the function

1	10
2	15
3	NameError

Printing f will result in 10 because f=10 is a global variable

The function named sum is called – it will execute the function (lines 2 to 4).

Printing a will result in error because a is a local variable.

The example below has 2 global variable – **f=10** and **a=1** and 1 local variable - **a**. The function is called

1	f=10
2	a=1
3	def sum(x,y):
4	a=f+x+y
5	print(a)
6	
7	print(f)
8	sum(3,2)
9	print(a)

f=10 is the global variable – outside the function

a=1 is the global variable – outside the function

a is the local variable – inside the function

Output

1	10
2	15
3	1

Printing f will result in 10 because f=10 is a global variable

The function named sum is called – it will execute the function (lines 3 to 5).

Printing a will result in 1 because a=1 is a global variable

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Lesson 7.1:

Type or fill in the following and decide if the chosen variable is a Global or Local variable.

**The numbers represent the lines.*

Task 1:

Is num a Global or Local variable?

1	num=1
2	def funct():
3	val=3
4	print(val)

Answer

1	
---	--

Task 2:

Is num a Global or Local variable?

1	def funct():
2	num=3
3	print(num)

Answer

1	
---	--

Task 3:

Is num a Global or Local variable?

1	def funct():
2	val=3
3	print(val)
4	num=5

Answer

1	
---	--

Task 4:

Is num a Global or Local variable?

1	def funct():
2	num=3
3	print(num)
4	num=5

Answer

1	
---	--

*Which num is a global variable, and which num is a local variable?

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Lesson 7.1:

Type or fill in the following to get/fill in the output after pressing F5

**The numbers represent the lines.*

Task 5:

1	num=1
2	def funct():
3	num=3
4	print(num)
5	
6	print(num)
7	funct()

Output

1	
2	

Task 6:

1	num=5
2	def funct():
3	num=20
4	
5	print(num)
6	funct()
7	print(num)

Output

1	
2	

Task 7:

1	num=12
2	def funct():
3	num=15
4	print(num)
5	
6	print(num)
7	funct()
8	print(num)

Output

1	
2	
3	

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Lesson 7.2

Global variables can also be defined within the function. As with Global Variables defined outside of a function, ALL Global Variables are remembered, and the data stored inside a Global Variable will be retained outside of the function.

Recap - The example below has 1 global variable – f=10 and 1 local variable - a. The function is called

Output

1	f=10
2	def sum(x,y):
3	a=f+x+y
4	print(a)
5	
6	print(f)
7	sum(3,2)
8	print(a)

f is the global variable – outside the function

a is the local variable – inside the function

1	10
2	15
3	NameError

Printing f will result in 10 because f=10 is a global variable

The function named sum is called – it will execute the function (lines 2 to 4).

Printing a will result in error because a is a local variable.

A global variable can be modified inside a function and change for the entire program

The example below has 1 global variable – z=10. The global variable is modified inside the function to z=20

Output

1	z=10
2	def sum(x,y):
3	global z
4	z=20
5	a=z+x+y
6	print(a)
7	
8	sum(3,2)

1	25
---	----

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Lesson 7.2

The example below has 2 global variable – **f=10** and 1 local variable - **a**. We have set **a** to be global with “**global a**”. The function is called

		Output		
1	f=10	f is the global variable – outside the function	1	10
2	def sum(x,y):		2	15
3	global a	a is the local variable – inside the function	3	15
4	a=f+x+y			
5	print(a)			
6				
7	print(f)			
8	sum(3,2)			
9	print(a)			

Printing f will result in 10 because f=10 is a global variable	
The function named sum is called – it will execute the function (lines 2 to 5).	
Printing a will result in 15 because we have set global a	

The example below has 2 global variable – **f=10** and **a=100** and 1 local variable - **a**. We have set **a** to be global with “**global a**”. The function is called

		f=10 is the global variable – outside the function	Output	
1	f=10	a=100 is the global variable – outside the function	1	10
2	a=100		2	100
3	def sum(x,y):	a is the local variable – inside the function	3	15
4	global a		4	15
5	a=f+x+y	Printing f will result in 10 because f=10 is a global variable		
6	print(a)			
7				
8	print(f)		Printing a will result in 100 because a=100 is a global variable	
9	print(a)			
10	sum(3,2)		The function named sum is called – it will execute the function (lines 3 to 6).	
11	print(a)			
			Printing a will result in 15 because we have set global a	

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Lesson 7.2:

Question 1:

What will be the output to the code below? Explain your answer

1	def f1():
2	x=15
3	print (x)
4	
5	x=12
6	f1()

- a. Error
- b. 12
- c. 15
- d. 1512

Question 2:

What will be the output to the code below? Explain your answer

1	def f2():
2	x=100
3	print (x)
4	
5	x+1
6	f2()

- a. Error
- b. 100
- c. 101
- d. 99

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Lesson 7.2:

Question 3:

What will be the output to the code below? Explain your answer

1	def f3():
2	global x
3	x+=1
4	print (x)
5	
6	x=12
7	print("x")

a. Error

b. 13

c. 13

x

d. x

Question 4:

What will be the output to the code below? Explain your answer and why is it different from Question 3.

1	def f4():
2	global x
3	x+=1
4	print (x)
5	
6	x=12
7	f4()

a. Error

b. 13

c. 13

x

d. x

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Lesson 7.2:

Question 5:

What will be the output to the code below? Explain your answer

1	def f5(x):
2	global x
3	x+=1
4	print (x)
5	
6	f5()
7	print("hello")

- a. Error
- b. hello
- c. 16
- d. 16
hello

Question 6:

What will be the output to the code below? Explain your answer and why is it different from Question 5.

1	def f6(x):
2	x+=1
3	print (x)
4	
5	f6()
6	print("hello")

- a. Error
- b. hello
- c. 16
- d. 16
hello

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Lesson 7.2:

Question 7:

What will be the output to the code below? Explain your answer (Recap default arguments)

1	x=12
2	def f7(a,b=x):
3	print (a,x)
4	
5	x=15
4	f7(4)

- a. 4 15
- b. 4 12
- c. 12 4
- d. 15 4

Question 8:

What will be the output to the code below? Explain your answer and why is it different from question 7

1	x=12
2	x=15
3	def f8(a,b=x):
4	print (a,x)
5	
6	f8(4)

- a. 4 15
- b. 4 12
- c. 12 4
- d. 15 4

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Lesson 7.2:

Question 9:

What will be the output to the code below? Explain your answer

1	def f9():
2	global a
3	print (a)
4	a="hello"
5	print(a)
6	a="world"
7	f9()

- a. hello
 world
- b. world
 hello
- c. world
- d. hello

Question 10:

What will be the output to the code below? Explain your answer and why is it different from question 9

1	def f10():
2	global a
3	print (a)
4	a="hello"
5	print(a)
6	a="world"
7	f10()
8	print(a)

- a. hello
 hello
 world
- b. world
 hello
 hello
- c. hello
 world
 world
- d. world
 hello
 world

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Lesson 7.2:

Type or fill in the following to get/fill in the output after pressing F5

**The numbers represent the lines.*

Task 1:

1	num=1
2	def funct():
3	num=3
4	num+=5
5	print(num)
6	
7	print(num)
8	funct()

Output

1	
2	

Task 2:

1	a=2
2	def funct():
3	global a
4	a=20
5	
6	print(a)
7	funct()
8	print(a)

Output

1	
2	

Task 3:

1	a=5
2	def funct():
3	global a
4	a+=3
5	
6	print(a)
7	funct()
8	print(a)

Output

1	
2	

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Lesson 7.2:

Task 4:

1	num=50
2	def funct():
3	global num
4	print("num is " + str(num))
5	num=100
6	print("num is changed to " + str(num))
7	
8	funct()
9	print("num is now " + str(num))

Output

1	
2	
3	

Task 5:

1	num=50
2	def funct():
3	global num
4	print("num is " + str(num))
5	num=100
6	print("num is changed to " + str(num))
7	
8	print("num is now " + str(num))

Output

1	
---	--

State the difference between Task 4 and Task 5

--

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Lesson 7.2:

Task 6:

1	a=2
2	b=5
3	def funct():
4	global b
5	a=20
6	b=50
7	
8	funct()
9	print(a)
10	print(b)

Output

1	
2	

Task 7:

Define a function `greet` with 1 global variable `x= "Hello"` and 1 local variable `y= "morning"`

Print the output below

Output

1	x="Hello"
2	def greet()::
3	y="morning"
4	
5	
6	
7	
8	

1	morning
2	HelloHello

Task 8:

Define a function `nums` with 1 global variable `x=5` and 1 local variable `x= 10`

Print the output below

Output

1	x=5
2	def nums()::
3	
4	x=10
5	
6	print (
7	nums()
8	print (

1	Global x is 5
2	Local x is 10

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Lesson 8.1:

Global Variables are useful to store information outside of a function. Some uses of Global Variables includes counting the number of times a function has been called. In the example below, the Global Variable, num, is used to count the number of times the function, add, is called.

Output

1	num=0
2	def add(x,y):
3	global num
4	num+=1
6	print(x+y)
7	
8	add(3,2)
9	add(5,2)
10	add(15.6,27.2)
11	add(7,5)
12	print('Function was called',num,'times.')

1	5
2	7
3	42.8
4	12
5	Function was called 4 times.

On the other hand, local variables are useful to ensure that unneeded data are overwritten. This allows the functions to carry out the operations without interfering, while saving valuable calculation space. In the example below, Local Variable (rem) is defined to help us calculate the remainder of the calculation. We define rem as a Local Variable, so that we can edit the value of the variable as needed.

Output

1	num=0
2	def remainder(x,y):
3	rem=5
4	print((x+y)%2)
5	
6	remainder(77,24)

1	1
---	---

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Lesson 8.1:

Type or fill in the following to get/fill in the output after pressing F5

**The numbers represent the lines.*

Task 1:

In this task, we will be writing a function that adds 3 numbers together and finding the remainder when the sum is divided by 17. Using this function, we have 3 groups of numbers to sum and using the sum to divide by 17.

At the end, we will print the number of times the function was called.

Output

1	number=0
2	def funct(x,y,z):
3	global number
4	number+=1
5	var=17
6	Total = x+y+z
7	print('The remainder is',(Total%var))
8	
9	funct(21,73,15)
10	funct(24,33,25)
11	funct(103,24,90)
12	print('The function was called',number,'times'.)

1	
2	
3	
4	

Task 2: Is there any difference if there is a global variable – var=15? Will the output change? Explain your answer

Output

1	var=15
2	number = 0
3	def funct(x,y,z):
4	global number
5	number+=1
6	var=17
7	Total = x+y+z
8	print('The remainder is',(Total%var))
9	
10	funct(21,73,15)
11	funct(24,33,25)
12	funct(103,24,90)
13	print('The function was called',number,'times'.)

1	
2	
3	
4	

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Lesson 8.1:

Task 3:

We are given 3 groups of numbers. (Line 9 to 11). In this task, we will be writing a function that adds 2 numbers together. Use the function to sum the individual groups of numbers. Print in the format "The sum is "

Print the number of times the function was called.

(You will have to complete line 3 and line 7. Take note of line 4)

Output

1	number=0
2	def funct(x,y):
3	global
4	number+=1
6	Total = x+y
7	print("The sum is",
8	
9	funct(4,4)
10	funct(5,5)
11	funct(6,6)
12	print('The function was called',number,'times')

1	
2	
3	
4	

Task 3:

We are given 4 groups of numbers. (Line 6 to 9). In this task, we will be writing a function to find the sum of the numbers in the 4 groups of numbers. Print the format "The sum of 4 groups of numbers is "

(You will have to complete line 3. Take note of line 4)

Output

1	sumofnumbers=0
2	def funct(group,number):
3	global
4	sumofnumber=sumofnumbers+number
5	
6	funct("Group1",1)
7	funct("Group2",2)
8	funct("Group3",3)
9	funct("Group4",4)
10	print("The sum of 4 groups of numbers is", sumofnumbers)

1	
---	--

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Lesson 8.1:

Task 4:

We are given 4 groups of different number of students. (Line 6 to 9). Each student is given \$1. In this task, we will be writing a function to find the total amount received by each group.

Print in the format "The total amount received by Group 1 is "

We will also need to find the total amount received by the 4 groups

Print in the format "The total amount received by the 4 groups is "

(You will have to complete line 3. Take note of line 4)

Output

1	total4group=0
2	def funct(group,number):
3	global
4	totalpergroup=number*1
5	total4group=total4group+totalpergroup
6	print("The total amount received by", group,
7	"is",totalpergroup)
8	funct("Group1",10)
9	funct("Group2",20)
10	funct("Group3",30)
11	funct("Group4",40)
12	print("The total amount received by the 4 groups
	is", total4group)

1	
---	--

Task 5:

Write a function that adds 3 numbers together. Use this function to sum the following groups of numbers. At the end, print the number of times the function was called.

Group A: 4,5,6

Group B: 91, 27, 73

Group C: 27.2, 73.4, 4.2

Group D: 8,9,17

Group E: 3,7,6

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Lesson 8.1:

Task 6:

Teacher Mandy has 5 classes in total. She has prepared 200 sweets for each class. Write a function that will print the number of sweets left over in each class. Your answer should be in the following format:

“Class ____ has ____ sweets left over.”

Class A: 21 students

Class B: 23 students

Class C: 29 students

Class D: 31 students

Class E: 27 students

Include a Global Variable that will add the number of students whenever the function is called. Print the total number of students Teacher Mandy has in the following format:

“Teacher Mandy has ____ students in total.”

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End of Lesson 8 Quiz

Question 1

Which of the following items are present in the function header?

- A. function name
- B. function name and parameter list
- C. parameter list
- D. return value

Question 2

Which of the following enclose the input parameters or arguments of a function?

- A. square brackets []
- B. parentheses ()
- C. curly braces {}
- D. quotation marks "

Question 3

Which of the following keywords marks the beginning of the function block?

- A. fun
- B. define
- C. def
- D. function

Question 4

What is a variable defined outside a function referred to as?

- a) A static variable
- b) A global variable
- c) A local variable
- d) An automatic variable

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End of Lesson 8 Quiz

Question 5

What is a variable defined inside a function referred to as?

- a) A global variable
- b) A volatile variable
- c) A local variable
- d) An automatic variable

Question 6

1	def add(x,y,z):
2	print(x+y+z)
3	
4	add(5,9,13)

In the function above, what are x, y and z referred to as?

- a) Local Variable
- b) Parameters
- c) Global Variable
- d) Function

Question 7

1	def add(x,y,z=0):
2	print(x+y+z)
3	
4	add(5,9,13)
5	add(8,7,3)
6	add(9,3,14)
7	add(3,5)
8	print('End')

In the function above, how many lines of output do we expect?

- a) 1
- b) 5
- c) 4
- d) I don't know

Python

Module 1 Lesson 7 and Lesson 8



Name:

Date:

End of Lesson 8 Quiz

Question 8

Define a function `employee` with keyword arguments – ID, name and age. Create a Global Variable named `number`. Use the function to print the employees shown in the table below. Your answer should be in the format:

“ID Number (ID) is named (name) and is (age) years old.”

At the end, print the number of employees in the following format:

“There are (number) employees in the company.”

ID	Name	Age
102	James	20
105	Alice	21
109	John	21
121	Jacob	20
129	Kenny	21
131	Amy	20

Question 9

Define a function `employee` with keyword arguments – name, amount and date. Create a Global Variable named `Money`. Use the function to print the employees shown in the table below. Your answer should be in the format:

“(name) has been credited (amount) on (date).”

At the end, print the total amount of money credited in the following format:

“The company has credited a total of \$____.”

Name	Amount	Date
James	5000	6/6/2020
Alice	6000	5/6/2020
John	3000	3/6/2020
Jacob	2000	8/6/2020
Kenny	4000	1/6/2020
Amy	4000	30/5/2020

Python

Module 1 Lesson 7 and Lesson 8



Name: _____

Date: _____

End of Lesson 8 Quiz

Question 10:

Jane works part time during the holidays. She is paid \$10 an hour, and works a variable number of hours every week. Her holidays lasts for 4 weeks, and she records her working hours in the table below. Write a function to showcase how much she makes in each week. Your answer should be in the format:

“In week ____ Jane earns \$____.”

At the end, print the total amount of money Jane earns during the holiday. Your answer should be in the format:

“Jane earns \$____ in total.”

Week 1: 24 hours

Week 2: 33 hours

Week 3: 19 hours

Week 4: 27 hours