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Lab Exercises Chapter 2 Solutions

What is the output produced by the following code fragment?

```
num1 = 2
num2 = 3
print (num1 + num2)
```

5

What is the output produced by the following code fragment?

```
num1 = 2
num2 = 3
print ("num 1 + num 2 = ", num1 + num2)
```

num 1 + num 2 = 5

Find the errors in the following program

```
Num1 = 2
num2 := 3
Sum = num1 + num2;
printf(sum)
```

:= not an operator
Num 1 is declared above not num1
printf should be print and sum should be Sum

Which of the identifiers below is valid and which are invalid? Why?

Num1	
time-of-day	cant have a -
tax_rate	
x5	
int	is a reserved word
7th_Rec	can't start with a number
yield	reserved word

How do you write comments in your code? Explain with an example.

Use # or ""

Why should you include comments?

For documentation purposes and to explain sections of code.

Lab Exercises Chapter 3 Solutions

Write a program that accepts a length in inches and prints the length in centimeters (1 inch = 2.54cm).

```
inch = int(input('Enter the value in inches: '))
cm = 2.54 * inch
print('{} inches = {}cm'.format(inch, cm))
```

Note use float() for real numbers instead of int() when casting the data type in line 1, and add {:.2f} in string place holder for two decimal places

Write a program that accepts your forename, surname and year of birth and adds them to an array.

You can insert into the array at specific index

```
student = ['one', 'two', 'three', 'four']
student[0] = 'first name'
student[1] = 'second name'
student[2] = '1988'
print(student)
```

Or append to the end of the array

```
student = ['one', 'two', 'three', 'four']
student.append('first name')
print(student)
```

Write a program that converts temperatures from Celsius to Fahrenheit.

$$F = C \times 9/5 + 32$$

```
fah = int(input('Enter the temperature in celcius: '))
cel = fah * 9/5 + 32
print('{} degrees C = {} Fahrenheit'.format(fah, cel))
```

Write a program that calculates the volume of a sphere

$$V = 4/3 \pi r^3$$

Import the math library to use Pi

```
import math
r = int(input('Enter the radius: '))
v = 4/3 * math.pi * r ** 3
print('Volume is {}'.format(v))
```

Write a program to calculate and display an employee's gross and net pay. In this scenario, tax is deducted from the gross pay at a rate of 20% to give the net pay.

```
gross = float(input('Enter the gross pay: '))
net = gross - gross * 20/100
print('Gross Pay {:.2f} Net Pay {:.2f}'.format(gross, net))
```

Write a program that stores a shopping list of 10 items. Print the whole list to the screen, then print items 2 and 8.

```
shoppingList = ['bread', 'milk', 'coffee', 'sugar', 'cereal', 'veg', 'beans', 'rice',
                'pasta', 'onions']
print(shoppingList[2])
print(shoppingList[8])
```

What does it print? Remember the list starts from 0 not 1.

```
coffee
pasta
```

Extend the previous program, to insert an item into the list.

```
shoppingList [2] = 'tea'
or append to end
shoppingList.append('ham')
```

What is a Boolean operator? Write a program to demonstrate.

Logic operator such as AND, NOT, OR. Commonly used to combine conditional statements (eg loops & if-else statements)

```
print (x < 10 and x < 20)
```

What is a comparison operator? Write a program to demonstrate.

Compares on value with another. More commonly used in loops and if else statements

```
x = 10
y = 14
print (x > y) #prints false as x is not greater than y
```

What is data type casting? Why do we need it? Write a program to demonstrate.

Convert a variable data type from one to another. Python converts data type into another data type automatically (implicit) depending on what value is assigned to the variable: string, int, etc. If you need to change the type using eg int(). This is explicit.

```
a = 2.2 #python casts as float
int(a) #change to integer
```

Lab Exercises Chapter 4 Solutions

Write a program to print the numbers 1 - 10 to the screen.

```
for counter in range(1, 11):  
    print("We're on %d" % (counter))
```

Write a program to print a list of names to the screen.

```
lists = ['name 1', 'name 2', 'name 3', 'name 4', 'name 5', 'name 6']  
for counter in lists:  
    print (counter)
```

Write a program to calculate and print the squares of the numbers from 1 to 10. Use \t if you want to display in a table.

```
for counter in range(1, 11):  
    print("Square of %d is %d" % (counter, counter*counter))
```

Write a program that accepts a number from the user until a negative number is entered.

```
userinput = 1  
while userinput > 0:  
    print ("Enter a number: ")  
    userinput = int(input())  
print ("ok")
```

Write a program that accepts an integer and prints the specified range it belongs to.

Range 1: 0 to 10

Range 2: 11 to 20

Range 3: 21 to 30

Range 4: 31 to 40

```
num = int(input("Enter number: "))  
if num > 40 :  
    print('Out of Range')  
elif num >= 30 :  
    print('Range 4')  
elif num >= 20:  
    print('Range 3')  
elif num >= 10:  
    print('Range 2')  
elif num >= 0:  
    print('Range 1')  
else:  
    print('Out of range')
```

Lab Exercises Chapter 5 Solutions

Write a program that gets a string from the user then writes it to a file along with the user's name.

```
name = input("Enter your name: ")
file = open('names.txt', 'w')
file.write(name)
file.close()
```

Modify the program from exercise 1 so that it appends the data to the file rather than overwriting.

```
name = input("Enter your name: ")
file = open('names.txt', 'a')
file.write(name)
file.write("\n")
file.close()
```

Write a program to write a list of names to a file.

```
file = open('file1.txt', 'w')
names = ['name 1', 'name 2', 'name 3', 'name 4']
for index in names:
    file.write("%s\n" % index)
file.close()
```

Write a program to read a file line by line and store it in a list.

```
file = open('file1.txt', 'r')
count = 0
for line in file:
    count += 1
    print("{} ".format(line.strip()))
file.close()
```

What is the difference between a text file and a binary file?

Binary files typically contain a sequence of bytes and are much smaller and faster than text files.

Text files store data in ASCII format and are plain text meaning they have no formatting. For example .txt, .py, .HTML, etc.

Binary files store data in binary format and are usually Images, Word and Excel documents, Videos, Applications (exe), etc.

Lab Exercises Chapter 6 Solutions

Write a program that accepts a number from the user and uses a function to square the number then return the result. Print the result to the screen.

```
def sq(a):  
    return a * a  
num = int(input("Enter a number: "))  
print (sq(num))
```

Write a function that returns the largest of two numbers. Test the function and print the results to the screen.

```
def largest(a, b):  
    if a > b:  
        return a  
    return b  
num1 = int(input("Enter number one: "))  
num2 = int(input("Enter number two: "))  
print (largest(num1, num2))
```

What is the difference between a local and a global variable?

Global is accessible from anywhere, local is only accessible within the function.

What makes a function recursive?

The function calls itself.

Write a program that prints first 10 positive numbers using a recursive function.

```
def display(num):  
    if(num) :  
        display(num-1)  
    else :  
        return  
    print ("{}".format(num))  
  
limit = int(input("Enter a number: "))  
print("\nNatural Numbers from 1 to {} are:".format(limit))  
display(limit)
```

Lab Exercises Chapter 7 Solutions

Write a program that accepts a number from the user and uses a function to square the number then return the result.

```
def sq(num1):  
    return num1 * num1
```

Save this file as a module

```
myfunctions.py
```

Import the module you just created into a new program.

```
import myfunctions
```

Call the function in the module

```
userInput = int(input("Enter a number: "))  
result = myfunctions.sq(userInput)  
print(result)
```

Create a new program and import the turtle graphics module.

```
import turtle
```

Experiment with drawing different shapes using some of the turtle graphics methods. Use the turtle commands to draw some shapes.

```
import turtle  
turtle.pensize(6)  
turtle.penup()  
turtle.pendown()  
for i in range(5):  
    turtle.forward(200)  
    turtle.right(144)  
turtle.done()
```


Lab Exercises Chapter 9 Solutions

Declare a new class called Vehicle without any attributes and methods

```
class Vehicle :
```

Add some attributes to the Vehicle class such as Name, Speed, Mileage

```
class Vehicle :  
    def __init__(self, name, speed, mileage):  
        self.name = name  
        self.speed = speed  
        self.mileage = mileage
```

Add a method to the Vehicle class to return the vehicle name

```
class Vehicle :  
    def __init__(self, name, speed, mileage):  
        self.name = name  
        self.speed = speed  
        self.mileage = mileage  
    def getName(self):  
        print (self.name)
```

Create a child class called Car that will inherit all the variables and methods of the Vehicle class

```
class Car (Vehicle):  
    def __init__ (self, name, speed, mileage):  
        super().__init__(name, speed, mileage)
```

Create a child class called Taxi

```
class Taxi (Vehicle):  
    def __init__ (self, name, speed, mileage):  
        super().__init__(name, speed, mileage)
```

Add a method to the Taxi class to collect the fair.

```
class Taxi (Vehicle):  
    def __init__ (self, name, speed, mileage):  
        super().__init__(name, speed, mileage)  
        self.fair = 0  
    def getFair(self):  
        self.fair = float(input("Enter Fair: "))
```

```
return self.fair
```

Let's test it...

Create a Taxi object called route84, pass the name, speed and mileage.

```
route84 = Taxi('Route 84', 66, 2343)
```

Call the getFair() method

```
route84.getFair()
```

Call getName() inherited method

```
route84.getName()
```