**Lab 1 - Exercise 2 - Variables, Assignment, Types And Operators**

***1. What is a Python comment? How do you indicate a comment? What purpose does it serve?***

Comments are used to explain Python code. They can be used to make the code more readable. Also comments can be used to prevent execution when testing code.

Single line comments in Python are identified with a **hash**symbol #.

*Example:*

#This is a comment

print("Hello, World!")

***2. What is a namespace in Python?***

A namespace in Python is a collection of currently defined symbolic names along with information about the object that each name references. An object might be the scope of a variable or a method.

*Example:*

x = 2

x > 1:

print (x)

***3. Whitespace:***  
  
***(a) When does whitespace matter?***

Whitespaces matter in Python when newlines terminate logical lines, and changes in indentation delimit blocks. Both of these behaviours are somewhat contextual. Python distinguishes physical lines from logical lines.

***(b) When does whitespace not matter?***

The whitespace needs to be consistent. So if you start using 4 spaces, you have to consistently use 4 spaces for the entire block. If you use a tab, you now have to use a tab. Everywhere else, whitespace is not significant and can be used as you like, just like in any other language.

***4. Mixed operations:***

***(a) What type results when you divide an integer by a float? A float by an integer?***

In Python, the standard division operator is '/'.

When you either divide an integer by a float or a float by an integer, in both cases the return value will be a float.

*Example:*

1 / 2.0

Result: 0.5

2.0 / 1

Result: 2.0

1 / 1

Result: 1.0

1 // 1

Result: 1

2.0 // 1

Result: 2.0

***(b) Explain why that resulting type makes sense (as opposed to some other type).***

The return value for the float division operator is always of type float, even when the operands of the operator are not float variables themselves.

***5. Consider integer values of a, b, and c and the expression (a + b) \* c. In mathematics, we can substitute square brackets, [ ], or curly braces, { }, for parentheses, ( ). Is that same substitution valid in Python?***

In Python, square brackets [ ] are used to make lists. Curly braces {} are used to make dictionary. Parentheses ( ) are used to make tuple. But for indexing in all of those, only square brackets are used.

*Example:*

a = 2

b = 5

c = 4

d = (a + b) + c

print(a)

***6. Which of the following are acceptable variable names for Python?***

***(a) xyzzy =*** Acceptable

***(b) 2ndVar =*** Not Acceptable

***(c) rich&bill =*** Not Acceptable

***(d) long name =*** Not Acceptable

***(e) good2go =*** Acceptable

***7. Give the values printed by the following program for each of the labelled lines.***

int\_a = 27

int\_b = 5

int\_a = 6

print(int\_a) *# Line 1*

print(int\_b + 5) *# Line 2*

print(int\_b) *# Line 3*

***(a) What is printed by Line 1?***

6 is printed in Line 1

***(b) What is printed by Line 2?***

10 is printed in Line 2

***(c) What is printed by Line 3?***

5 is printed in Line 3

***8. Give the values printed by the following program for each of the labelled lines, and***

***answer the associated questions.***

a\_float = 2.5

a\_int = 7

b\_int = 6

print(a\_int / b\_int) *# Line 1*

print(a\_int // a\_float) *# Line 2*

print(a\_int % b\_int) *# Line 3*

print(int(a\_float)) *# Line 4*

print(float(a\_int)) *# Line 5*

***(a) Line 1: What is printed? What is its type?***

Result: 1. 1666666666666667

Variable Type: Float

***(b) Line 2: What is printed? What is its type?***

Result: 2.0

Variable Type: Float

***(c) Line 3: What is printed? What is its type?***

Result: 1

Variable Type: Integer

***(d) Line 4: What is printed? What is its type?***

Result: 2

Variable Type: Integer

***(e) Line 5: What is printed? What is its type?***

Result: 7.0

Variable Type: Float

***9. Give the values printed by the following program for each of the labelled lines.***

a\_int = 10

b\_int = 3

c\_int = 2

print(a\_int + b\_int \* c\_int) *# Line 1*

print( (a\_int + b\_int) \* c\_int ) *# Line 2*

print(b\_int \*\* c\_int) *# Line 3*

***(a) What is printed by Line 1?***

Result: 16

***(b) What is printed by Line 2?***

Result: 26

***(c) What is printed by Line 3?***

Result: 9

***10. Change the program below to calculate and print the area of a rectangle instead.***

**from** math **import** pi

r = 12

area = pi \* r \*\* 2

print(**"The area of a circle with radius"**, r, **"is"**, area)

# Area of the rectangle

w = 12

h = 25

area = w \* h

print (“The area of a rectangle with width”, w, “and height”, h, “is”, area)

# Or

w\_str = input (“Please enter the width of the rectangle: ”)

h\_str = input (“Please enter the height of the rectangle: ”)

w =float (w\_str)

h = float (h\_str)

area = w \* h

print (“The area of a rectangle with width”, w, “and height”, h, “is”, area)

***11. Write a Python program that prompts for a number. Take that number, add 2, multiply by 3, subtract 6, and divide by 3. You should get the number you started with.***

number = float (input(“Please enter a number: ”))

result = (((number + 2) \* 3) - 6) / 3

print(result)

***12. Assignment:***

my\_int = 5  
my\_int = my\_int + 3  
print(my\_int)

***(a) If you execute the three lines of code, what will be printed? Explain your answer using the rules of assignment.***

Result : 8

We assignmy\_int + 3 with my\_int = 5.

***(b) Rewrite my\_int = my\_int + 3 using the += symbol.***

my\_int = 5  
my\_int += 3  
print (my\_int)

***13. Assignment:***

my\_var1 = 7.0  
my\_var2 = 5  
print(my\_var1 % my\_var2)

***If you execute these three lines of code, what will be printed?***

Result: 2.0

***14. Prompt for input and then print the input as a string, an integer, and a float-point value. What values can you input and print without errors being generated?***

print (int (“2”))

***15. Consider the expression (a + b) \* c , but with string values for a, b, and c. Enter that into the Python shell. What happens? Why?***

(“a” + “b”)

Result: ‘ab’

(“a” + “b”) \* 2

Result: ‘abab’

***16. (Integer operators) One way to determine whether an integer is even is to divide the number by 2 and check the remainder. Write a three-line program that prompts for a number, converts the input to an integer, and prints a 0 when the number is even and a 1 when the number is odd.***

number = int (input (“Please enter a number: ”))

remainder = number % 2

print (remainder)

Result: 1  
  
***17. Body mass index (BMI) is a number calculated from a person’s weight and height. According to the Centers for Disease Control and Prevention, the BMI is a fairly reliable indicator of body fatness for most people. BMI does not measure body fat directly, but research has shown that BMI correlates to direct measures of body fat, such as underwater weighing and dual-energy X-ray absorptiometry.***

***The formula for BMI is***

***weight / height²***

***where weight is in kilograms and height in meters.***

***(a) Write a program that prompts for metric weight and height and outputs the BMI.***

weigth = float (input (“Please enter your weight in kgs: ”))

height = float (input (“Please enter your height in meters: ”))

BMI = weight / height \*\* 2

print (BMI)

***(b) Write a program that prompts for weight in pounds and height in inches, converts***  
***the values to metric, and then calculates the BMI.***

weigth\_pounds = float (input (“Please enter your weight in pounds: ”))

height\_inches = float (input (“Please enter your height in inches: ”))

weigth\_kgs =weight\_pounds / 2.20462

height\_meters = height\_inches / 39.3701

BMI = weight\_kgs / height\_meters \*\* 2

print (BMI)