Programming Fundamentals

Lecture 2 – Basic Built in Functions

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Learning Outcomes

- This lecture addresses LO1, LO2 for the module
- On completion of this lecture, students are expected to explain and apply
  - Pseudocode
  - Built in Functions in python
  - Keyboards inputs
  - Work with strings
  - Augmented assignment operators

Pseudocode

- Tool for representing an Algorithm
- Implementing an algorithm in the form of annotations and informative text written in plain English
- Use during the planning stage of an algorithm
- Do not consider the language and its syntax, cannot execute
- Human readable and easy to understand
- Common keywords to indicate operations
  - Input : INPUT, READ, GET
  - Output: PRINT, OUTPUT
  - Compute : COMPUTE, CALCULTE
  - Initialize : SET
  - Add one : INCREMENT

Pseudocode Functionality

- Receiving input
- Put out information
- Perform arithmetic operations
- Assigning value to a variable or memory location
- Based on a condition to select one or two alternative actions
- Repeat a group of actions

Examples

- Calculate the average of three numbers.

```
INPUT num_1
INPUT num_2
INPUT num_3
average <- (num_1 + num_2 + num_3) / 3
PRINT average
```

- Convert m to cm

```
INPUT m.
SET cm = 0
If m is a number
    cm= m *100
    PRINT cm
 else
    PRINT “input is invalid”
```

```
num_1 = float(input("Enter the first number: "))
num_2 = float(input("Enter the second number: "))
num_3 = float(input("Enter the third number: "))
average = (num_1 + num_2 + num_3) / 3
print("The average of the three numbers is:", average)
```

```
import java.util.Scanner;

public class Average {
   public static void main(String[] args) {
      Scanner input = new Scanner(System.in);
      System.out.print("Enter the first number: ");
      double num1 = input.nextDouble();
      System.out.print("Enter the second number: ");
      double num2 = input.nextDouble();
      System.out.print("Enter the third number: ");
      double num3 = input.nextDouble();
      double average = (num1 + num2 + num3) / 3;
      System.out.println("The average of the three numbers is: " +
average);
   }
}
```

Exercise 1

```
running_total = 0
running_total += 5
running_total += 8
running_total += 2
running_total += 3
print(running_total)
```

```
public class Main {
    public static void main(String[] args) {
        int runningTotal = 0;
        runningTotal += 5;
        runningTotal += 8;
        runningTotal += 2;
        runningTotal += 3;
        System.out.println(runningTotal);
    }
}
```

- Write the **pseudocode** to put zero into variable running_total. Then write separate instructions to add the following numbers onto what is in the variable, adding one number at a time 5, 8, 2, 3. Print running_total

- Pseudocode to convert Fahrenheit Celsius for a given value

```
fahrenheit = float(input("Enter temperature in Fahrenheit: "))
celsius = (fahrenheit - 32) * 5 / 9
print("Temperature in Celsius: ", celsius)
```

- Pseudocode to find the largest number for the following sequence.

  7, 1,2,10,15,-5,6

Python Built in Functions : print()

- Sends content to the screen
  - print() #empty line
  - print('hello') #print hello
  - print(100) #print 100
- Multiple objects
  - Print('hello', 'world', 'again') #hello world again
- Print a variable
  - a=100
    print(a)

Python Built in Functions : type() and input()

- type() check the type of the variable
  - type(10) # <class 'int'>
  - type(45.32) # <class 'float'>
  - type('hello') # <class 'str'>

- input() waits for the user to enter data
  - input('please enter a number') #Prompt for a number
  - inst = 'what is your name'
    answer=prompt(inst)

Type conversions

- Conversion to int
  - int('10') #convert from String to int.
  - int("hello") # ValueError: invalid literal for int()
  - int(15.458) #new value 15
- Conversion to float
  - float("10") #new value is 10.0
  - float("3.14") #no difference
- Conversion to String
  - str(15) #new value '15'

Exercise 2

- Output
  - print(int(7.6598)) # ?
  - print(int(-2.56))

- Note: clear difference between math.floor() and int()

Python Strings

- Sequence of characters
- Use “” or ‘’ when forming Strings in python
- Special scenarios
  - "Bruce's car" # single quote inside a double quote, valid
  - 'She said "Hi!" ' # Double quote inside single quotes, valid again
  - ‘Bruce\'s beard’ # Use \ to escape ‘s
  - print(‘first.\n second') # \n refers to new line

- Common escape sequences
  - \n #instruct to move to a new line
  - \t #tabs
  - \\, \’ , \” #escape \, ’, ”” respectively

String built in functions

- Python has several predefined functions in order to manipulate Strings
  - format() to format the string
    - txt2 = "My name is {0}, I'm {1}".format("John",36)
  - strip() to trim the String
    - txt = " banana "
      x = txt.strip()
  - replace(), join(), isupper(), encode() , etc.

Augmented Assignment Operators

- Preincrement (--x) and postincrement (x++) not supported by Python
- But can following operators to shortened the expression

Operator	Example	Equivalent to
+=	x += 5	x = x+5
-=	x -= 5	x = x-5
*=	x *= 5	x = x*5
/=	x /= 5	x = x/5

Summary

- Pseudocode is not language specific and use during the initial design
- Several built-in functions : print(), type() and input()
- Type conversions and errors
  - str to int / int to float/ float to int
- String manipulation
  - Double , single quotes
  - Escape characters
  - Several predefined str functions
- Augmented Assignment operators : += ,-=, *=, /=