MIT AITI
Python Software Development

Lab 01: Basic Python

In this lab we practice all that we have learned on variables (lack of types), naming conventions, numeric types and coercion, strings, Booleans, and operator grouping.

Exercise 1:

1. **Variable Names**

   Which of these variable names are valid? (If you aren't sure, you can test from the Python shell.)

   1. x
   2. 56thnumber
   3. length
   4. !Tayo!
   5. NUMBER
   6. Android_phone1
   7. this variable

2. **Types**

   Write down the data type for each of the following variables. Pay special attention to punctuation: values are not always the type they seem!

   1. a = False
   2. b = 3.7
   3. c = 'Alex'
   4. d = 7
   5. e = 'True'
   6. f = 17
   7. g = '17
   8. h = True
   9. i = '3.14159'
   10. j = "---add---"

   If you get stuck, test the code from the Python shell

Exercise 2:

1. Boolean operators can seem tricky at first, and it takes practice to evaluate them correctly. Write the value (True or False) produced by each expression below, using the assigned values of the variables a, b, and c.

   a = False
   b = True
   c = False

   1. b and c
   2. b or c
   3. not a and b
   4. (a and b) or not c

5. not b and not (a or c)
6. not ((not b or not a) and c) or a

Remember, to work from the inside out, starting with the inner-most expressions.

Evercise 3: Data Types in Arithmetic

What are the outputs of each of the following equations?

1. 5/2
2. 5/2.0
3. 5.0/2
4. 7*(1/2)
5. 7* (1/2.0)
6. 5 ∗∗2
7. 5.0 ∗ ∗2
8. 5 ∗ ∗2.0
9. 1/3
10. 1/3.0

Exercise 4: User input:

In this exercise, we will ask the user for his or her first and last name and date of birth and print them out formatted. Create a new file and call it **userinput.py**. Here is an example of what the program would do:

```
Enter your first name: Anne
Enter your last name: Willims
Enter your date of birth:
      Month? July
      Day? 31
      Year? 1980
Anne Williams was born on July 31, 1980
```

The text in italics is the what the user inputs.

Exercise5: Zeller's Algorithm- Extra Credit

Zeller's algorithm computes the day of the week on which a given date will fall (or fell). In this exercise, you will write a program to run Zeller's algorithm on a specific date. You will need to create a new file for this program, zellers.py. The program should use the algorithm outlined below to compute the day of the week on which the user's birthday fell in the year you were born and print the result to the screen.

Start with the program in Exercise 2.6, but ask for the month as a number between 1-12 where March is 1 and February is 12. If born in Jan or Feb, enter previous year (see the notes below). In the end, print out the name of the user and the day of the week they were born.

Zeller's algorithm is defined as follows:

Let A, B, C, D denote integer variables that have the following values:
A = the month of the year, with March having the value 1, April the value 2, … December the value 10, and January and February being counted as months 11 and 12 of the preceding year (in which case, subtract 1 from C)
B = the day of the month (1, 2, 3, … , 30, 31)

C = the year of the century (e.g. C = 89 for the year 1989)
D = the century (e.g. D = 19 for the year 1989)
Note: if the month is January or February, then the preceding year is used for computation. This is because there was a period in history when March 1st, not January 1st, was the beginning of the year.

Let W, X, Y, Z, R also denote integer variables. Compute their values in the following order using integer arithmetic:
W = (13*A - 1) / 5
X = C / 4
Y = D / 4
Z = W + X + Y + B + C - 2*D
R = the remainder when Z is divided by 7

The value of R is the day of the week, where 0 represents Sunday, 1 is Monday, ... , 6 is Saturday. If the computed value of R is a negative number, add 7 to get a non negative number between 0 and 6.

Print out R. You can check to be sure your code is working by looking at http://www.timeanddate.com/calendar/.

Run some test cases- try today's date, your birth date, any other dates you like.