

Python for Big Data: Activity Set 2

This activity set assumes that you have installed Python 3.x and are using IDLE.

Python Expressions

Python uses arithmetic expression in pretty much the same way as C or Java. We have the unary negation operator “ - ” for negation, and the binary operators “ + ”, “ - ”, “ * ”, “ / ”. Exponentiation is given by “**”. Parentheses are used to change operator precedence from the usual defaults.

1. Use IDLE to calculate the following expressions on a single line.

(a) 2×5

(b) 2^{10}

(c) $\frac{5 + 1}{5^2 + 2}$ (Hint: You need to use parentheses).

(d) $\sqrt{5}$ (Hint: exponentiate with 1/2)

(e) Try to figure out how Python uses operator precedence in expressions with double operators, such as 2^{**3**4} or $2/3/4$. With other words, is the first expression calculated as $(2^{**3})^{**4}$ or as $2^{**(3^{**4})}$.

2. Python knows types such as int (integer), float (floating point), string, boolean, user-defined types, and a few others, even if these types are not explicitly declared. The result of an operation depends on the types. For example, the asterisk means multiplication between operands of numeric type and means repetition between an integer and a string. A string is just a sequence of characters between single or double quotation marks. Calculate the results of the following expressions in IDLE

(a) $(-3)^{*56}$

(b) $(-3)^{**hi}$

(c) hi^{**31}

In IDLE, we open up a new file by using the FILE tab and selecting New (or by typing the action sequence, which depends on the Operating System). The file needs to be saved before it can be run (using the F5) button. Our first Python program was the famous “Hello World” program. It consists of a single line:

```
print("Hello World.")
```

Notice that the line has to be flushed left, there should be no white spaces in front of it. Until Python 3.x, print was not a function, so that you could avoid the pair of parentheses. Print is smart of what to do, and will try to translate any of its arguments into a string to print out. Here, we are already providing a string by placing it into quotation marks. For short strings, you can use the single or the double quotation marks. In fact, Python is pretty smart in trying to figure out what you mean, so that you can use the single quotation mark as an apostrophe inside a string given between double quotation marks.

If you want to use a different script, you can. By default, Python3 uses utf-8 encoding. If you preface a string with the letter u, you can give unicode codes by using an escape-u sequence just before the four letter hex code. Here is my attempt at writing in Gujarati:

```
print(u'\u0A85\u0AAE\u0AA6\u0ABE\u0AB5\u0ABE\u0AA6')
```

where I consulted the web for the unicode characters. If your system allows you to install different virtual keyboards, you can use them directly to input unicode code, as in

```
print(u'पसातट')
```

with some random Hindi letters.

3. Change the program to say “Hello World” in a different language. You use to need Latin letters for the time being. Later on, you can specify an encoding.

Python keyboard input is very simple. You use the input statement that has as sole argument the prompt. The result is a string. Depending on how you want to process it, you probably want to cast to a numerical value by using the int or float function.

Here is a very simple Rupees to US\$ converter. The first line takes the user input and converts it into a floating point value. Notice the space after the colon in the string. Without it, the prompt and the user input will run into each other. The second line prints out the result. If you give several arguments to print, it will print them out with a default space between them. We will discuss string formatting later.

```
rupees = float(input('Amount in rupees: '))  
print(0.015*rupees, 'US$')
```

4. Write similar conversion programs for dollars to rupees, pounds to euros, and yen to rupees.
5. See what happens if you give non-numeric values to the program.
6. Use the same type of program in order to change imperial measures to the metric system. For instance, change nautical miles to kilometers.