

INFO-H-600 - Computing foundations of data sciences
TP 1 - Introduction to Python: Values, variables, types, expressions, ...
based on some exercises of INFO-F-101

Ex. 1. Enter the following expressions in the interpreter and look at the result:

1. 5
2. 5 + 1
3. x = 5
4. x + 1
5. x = x + 1
6. x

Ex. 2. Use the interpreter to print the following texts:

1. Hello World
2. Aujourd'hui
3. C'est "Dommage !"
4. Hum \o/

Ex. 3. Evaluate (by hand) the following expressions and try to guess the type of result expected (in mathematics and in Python). Then try to execute them with the interpreter to check your answers:

1. 14 - 14
2. 1 + 6.9
3. 1.0 + 2.0
4. $\frac{18}{7+1}$
5. $\frac{(3+2)*2.5}{4*2}$
6. $3^{-\frac{1}{2}}$
7. 0 * 0.0

Ex. 4. Some of the following lines contain errors. These can be syntax errors or semantic errors. For each of them, briefly explain the kind of error expected. Check your answers with the interpreter.

1. print(' 'Bonjour')
2. 'bla' * 3.0
3. ((1 + 4) / (6 * 2))
4. int(' '14'')
5. int('3+4i')
6. '3 * 3 = ' * 3 ** 2
7. 3 + 2 / 0 + 2

```
8. print('Il y a' + 31 + 'jours en janvier')
```

Ex. 5. Suppose two variables : a, b . How could you proceed to swap the values of these two variables. For instance, if a and b have the values $a = 1, b = 2$, how could you obtain 2 1 on the screen by typing `print(a, b)` ?

Ex. 6. Resolve the following problem using the interpreter: the volume of a sphere of radius r is given by $\frac{4}{3}\pi r^3$. What is the volume of a sphere of radius 5 ? (Note that 392.6 is not the correct answer!)

Ex. 7. Solve the following problems using the interpreter:

1. The price of a book is of \$24.95 but you have a discount of 40 %. The shipping costs for the first book is of \$3 and of 75 cents for each additional book. What is the total cost for 60 books ?
2. You travel 10 km in 43 min and 30s. What is your average time per mile ? What is your average speed in miles per hour ? (1.61km = 1 mile)
3. Suppose that the average walking speed is of 8 minutes and 15 seconds per kilometer. An higher speed is of 7 minutes and 12 seconds per kilometer. You start at 6h52 and walk one kilometer at average walking speed, followed by 3 kilometers at an higher speed, and then another kilometer at average speed. At what time will you arrive ?

Ex. 8. In the IDE or text editor of your choice, write a file `hello.py` containing the following code:

```
| print("Hello, world")
```

Execute this file.

Ex. 9. Write a file containing the following code and execute it. Be sure to understand every line.

```
| print("This program computes the are of a rectangle.")
| side_a = input("Please entrer the length of the rectangle : ")
| side_a = float(side_a)
| side_b = float(input("Please entrer the width of the rectangle : "))
| area = side_a * side_b
| print("The area of the rectangle is", area)
```

Ex. 10. Write a python script that asks to the user to enter its name and then says "hello". For instance, if the user enters `Charles`, the program must show: `Hello, Charles`

Ex. 11. Write a python script like the one of exercise 9, which asks to the user to enter the radius of a circle and uses it to compute the are and circonference of the circle. Use 3.14 for π .

Ex. 12. Write a script that asks to the user to enter the x and y coordinates of two points and computes the euclidian distance between these two points. This distance between tow points A and B is defined by:

$$d(A_{[x_a, y_a]}, B_{[x_b, y_b]}) = \sqrt{(x_a - x_b)^2 + (y_a - y_b)^2}$$

Look in the documentation how to compute the square root.

Ex. 13. Write a script that asks to the user to enter a word and will print it surrounded by stars. For instance, if the user enters `machine`, the script will show:

```
*****
* machine *
*****
```

To do this, you will need to be able to compute the lenght of a string. This can be done using the function `len()`. For instance, `len("hello")` will return 5. You can then use string multiplication:

```
| >>> 'a' * 5
| 'aaaaa'
| >>>
```