

PROGRAMMING REFRESH EXERCISES

Master in Environmental Management of Mountains Areas

ADVANCED GEOMATICS

Andrea Antonello - Free University of Bolzano

March - June 2024

EXERCISE 1

Complete the script to print the sentence:

```
Hei, I am Mario Rossi  
I am 25 and I love to go skating  
I work as an engineer
```

go on here:

```
1 age = 25  
2 name = "Mario Rossi"  
3 activity = "skating"  
4 job = "engineer"  
5  
6 # your turn
```

EXERCISE 2

You have a gas sensor that outputs a string in the following format, one line every 300 milliseconds:

```
analogreading:200;maxvoltage:3.3;maxanalog:4095
```

Write a function to extract the **voltage** from the current reading.

You can assume a linear behaviour between analogue reading and voltage:

- 0 - minanalog
- 0 - minvoltage

Read the data file **01_exe2_data.csv**.

EXERCISE 3

Take the string:

```
a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s
```

and make it:

```
a;b;c;d;e;f;g;h;i;j;k;l;m;n;o;p;q;r;s
```

go on here:

```
1 string = "a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s"  
2  
3 # your turn
```

EXERCISE 4

Complete the script to print the following:

```
1  
2  
3  
4  
5
```

go on here:

```
1 list = [ 1, 2, 3, 4, 5]  
2  
3 # your turn
```

EXERCISE 5

Complete the script to print the following:

```
Number 1  
Number 2  
Number 3  
Number 4  
Number 5
```

go on here:

```
1 list = [ 1, 2, 3, 4, 5]  
2  
3 # your turn
```

EXERCISE 6

Complete the script to print the following:

```
Number 10  
Number 20  
Number 30  
Number 40  
Number 50
```

go on here:

```
1 list = [ 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 ]  
2  
3 # your turn
```

EXERCISE 7

Complete the script to print the following:

```
first is 1
second is 2
third is 3
fourth is 4
fifth is 5
```

go on here:

```
1 list1 = [1, 2, 3, 4, 5]
2 list2 = ["first", "second", "third", "fourth", "fifth"]
3
4 # your turn
```


EXERCISE 8

Complete the script to print the following:

```
Characters count: 449
Characters count without spaces: 377
Word count: 67
```

go on here:

```
1 string = """Lorem ipsum dolor sit amet, consectetur adipiscing elit,
2 sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
3 Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris
4 nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in
5 reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla
6 pariat. Excepteur sint occaecat cupidatat non proident, sunt in
7 culpa qui officia deserunt mollit anim id est laborum."""
8
9 # your turn
```

EXERCISE 9

Complete the script to print out only the lines that contain data:

```
1, 123.5  
2, 234.8  
3, 885.9  
4, 642.7  
5, 12445.0  
6, 22.3
```

Read the data from the file `01_exe9_data.csv`.

EXERCISE 10

Complete the script to print only **valid** data, considering 0-1000 as a valid range:

```
1, 123.5  
2, 234.8  
3, 885.9  
4, 642.7  
6, 22.3
```

Read the data from the file `01_exe9_data.csv`.

EXERCISE 11

Complete the script to print the areas of the triangles in the following format:

```
base * height / 2 = 10.0 * 35.0 = 175.0cm2
base * height / 2 = 40.0 * 135.0 = 2700.0cm2
base * height / 2 = 90.0 * 5.0 = 225.0cm2
base * height / 2 = 410.0 * 25.0 = 5125.0cm2
base * height / 2 = 1000.0 * 345.0 = 172500.0cm2
```

Read the data from the file 01_exe11_data.csv.

EXERCISE 12

Complete the script to link the information in the dictionaries by id:

```
Daisy dreams in her bed.  
Joe plays in the livingroom.  
Will walks up the mountain.  
Hanna runs to town.
```

go on here:

```
1 who = {  
2     "Daisy": 11,  
3     "Joe": 201,  
4     "Will": 23,  
5     "Hanna": 44  
6 }  
7 what = {  
8     44: "runs",  
9     11: "dreams",  
10    201: "plays",  
11    23: "walks"  
12 }  
13 where = {  
14     44: "to town.",  
15     11: "in her bed.",  
16     201: "in the livingroom.",  
17     23: "up the mountain."  
18 }
```

EXERCISE 12

Complete the script to link the information in the dictionaries:

```
Daisy dreams in her bed.  
Joe plays in the livingroom.  
Will walks up the mountain.  
Hanna runs to town.
```

go on here:

```
1 who = {  
2     "Daisy": 11,  
3     "Joe": 201,  
4     "Will": 23,  
5     "Hanna": 44  
6 }  
7 what = {  
8     44: "runs",  
9     11: "dreams",  
10    201: "plays",  
11    23: "walks"  
12 }  
13 where = {  
14     "runs": "to town.",  
15     "dreams": "in her bed.",  
16     "plays": "in the livingroom.",  
17     "walks": "up the mountain."  
18 }
```

EXERCISE 13

Complete the script to count the occurrences of each letter contained in the lists (altogether). The result should be in the format:

```
count of a = 3
count of b = 1
count of c = 4
count of d = 4
count of e = 4
count of f = 3
count of g = 2
count of h = 2
```

go on here:

```
1 list1 = ["a", "b", "c", "d", "e", "f"]
2 list2 = ["c", "d", "e", "f", "g", "h", "a"]
3 list3 = ["c", "d", "e", "f", "g"]
4 list4 = ["c", "d", "e", "h", "a"]
5
6 # your turn
```

EXERCISE 14

Read the **stations.txt** file and print out the first 20 lines.

EXERCISE 15

Read the **stations.txt** file and print the count of the stations contained.

EXERCISE 16

Read the **stations.txt** file and print the count of the columns contained.

EXERCISE 17

Read the **stations.txt** file and print the first 20 lines, but only the station id and name.

EXERCISE 18

Read the **stations.txt** file and calculate the average height of the stations contained.

EXERCISE 19

Create a script to parse the **stations.txt** file and print a summary like this:

```
File info: stations.txt
```

```
-----
```

```
Stations count: 11603
```

```
Average value: 135
```

```
Available fields:
```

```
-> STAID
```

```
-> STANAME
```

```
-> CN
```

```
-> LAT
```

```
-> LON
```

```
-> HGHT
```

```
First data lines:
```

```
#STAID, STANAME
```

```
1, VAEXJOE
```

```
2, FALUN
```

```
3, STENSELE
```

```
4, LINKOEPING
```

```
, CN,
```

```
LAT,
```

```
LON, HGHT
```

```
, SE, +56:52:00, +014:48:00, 166
```

```
, SE, +60:37:00, +015:37:00, 160
```

```
, SE, +65:04:00, +017:09:59, 325
```

```
, SE, +58:24:00, +015:31:59, 93
```

EXERCISE 20

Create a script to parse the `station_data.txt` file and print a summary like this:

```
File info: station_data.txt
```

```
-----
```

```
Stations count: 55087
```

```
Average value: 27
```

```
Available fields:
```

```
-> STAID
```

```
-> SOUID
```

```
-> DATE
```

```
-> RR
```

```
-> Q_RR
```

```
First data lines:
```

#STAID,	SOUID,	DATE,	RR,	Q_RR
173,	554,18580101,	0,	0	
173,	554,18580102,	0,	0	
173,	554,18580103,	0,	0	
173,	554,18580104,	0,	0	

EXERCISE 21

Print out **n** lines of **m** asterisks in less than 10 lines of code.

```
*****  
*****  
*****  
*****  
*****  
*****  
*****  
*****  
*****  
*****  
*****
```

go on here:

```
1 n = 10  
2 m = 5  
3  
4 # your turn
```

EXERCISE 22

Print out **n** lines with an increasing number of asterisks, starting from 1.

```
*  
* *  
* * *  
* * * *  
* * * * *  
* * * * * *  
* * * * * * *  
* * * * * * * *  
* * * * * * * * *  
* * * * * * * * * *  
* * * * * * * * * * *  
* * * * * * * * * * * *
```

go on here:

```
1 n = 10  
2  
3 # your turn
```


EXERCISE 23

Print out **n** lines with an decreasing number of asterisks, starting from the line number.

```
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****
*****
```

go on here:

```
1 n = 10
2
3 # your turn
```

EXERCISE 24

Given a number `a` list all even numbers from 0 to `a` and print out the sum.

Go on here:

```
1 a = 10
2
3 # your turn
```

EXERCISE 25

Given a list of random numbers, list all even numbers and print out the sum.

Go on here:

```
1 numbers = [123, 345, 5, 3, 8, 87, 64, 95, 9, 10, 24, 54, 66]
```

EXERCISE 26

Join the data from the two datasets **01_exe26_dataset1.csv** and **01_exe26_dataset2.csv** based on the common id and print out the result.

