Industrial Software Development (ISDe) – February 1, 2021

Name: .... Surname: .... Student ID: ....

EXERCISE 3 (15 points) - 40 minutes
A 'rectangle' object has **length** and **width** attributes.

a) Implement the class so that the attributes are settable only through **@properties**. **length** and **width** cannot be negative.

EXAMPLE

```
# Use exactly this 'MAIN'
# This code must run correctly, producing the output in the comments

r1 = Rectangle(10, 20)
print('r1:', r1.length, r1.width)
# 10, 20
r1.length = -5
print('r1:', r1.length, r1.width)
# 10, 20

r1.length = 15
print('r1:', r1.length, r1.width)
# 15, 20

r1.width = 25
print('r1:', r1.length, r1.width)
# 15, 25
```

The output is:

```
r1: 10 20
r1: 10 20
r1: 15 20
r1: 15 25
```

b) Various objects **obs_1, …, obs_n** could be interested in a change of the rectangle. In particular, obs_1 is interested in a change of the **length**, obs_2 in a change of the **width**, obs_3 in a change of both. Implement this behavior and complete the code below.

```python
# Use exactly this 'MAIN'
# This code must run correctly, producing the output in the comments

r1 = Rectangle(10, 20, ['length', 'width'])

# CODE OMITTED --- COMPLETE

#  obs_1 is interested in a change of the length,
#  obs_2 in a change of the width,
#  obs_3 in a change of both.

#
print('\n set length = 15')
r1.length = 15
print('r1:', r1.length, r1.width)
# 15, 20

print('\n set width = 25')
r1.width = 25
print('r1:', r1.length, r1.width)
# 15, 25

print('\n\n obs 1 and obs_3 are no longer interested')

# CODE OMITTED --- COMPLETE

print('\n set length = 45')
r1.length = 45
print('r1:', r1.length, r1.width)
# 45, 25

print('\n set width = 55')
r1.width = 55
print('r1:', r1.length, r1.width)
# 45, 55
```

The output is

```
set length = 15
obs_1 : ->  length has changed!
obs_3 : ->  length has changed!
r1: 15 20

 set width = 25
obs_3 : ->  width has changed!
obs_2 : ->  width has changed!
r1: 15 25


 obs 1 and obs_3 are no longer interested

 set length = 45
r1: 45 25

 set width = 55
obs_2 : ->  width has changed!
r1: 45 55
```