In [2]:
```
import numpy as np
import matplotlib.pyplot as plt
```

Exercice Numpy

1. Array creation

- Create a 1D array with values from 0 to 10 and in steps of 0.1. Check the shape of the array:

In [ ]:

- Create an array of normally distributed numbers with mean $\mu = 0$ and standard deviation $\sigma = 0.5$. It should have 20 rows and as many columns as there are elements in `xarray` . Call it `normal_array` :

In [ ]:

- Check the type of `normal_array` :

In [ ]:

2. Array mathematics

- Using `xarray` as x-variable, create a new array `yarray` as y-variable using the function $y = 10 * cos(x) * e^{-0.1x}$:

In [ ]:

- Create `array_abs` by taking the absolute value of `array_mul` :

In [ ]:

- Create a boolan array (logical array) where all positions > 0.3 in `array_abs` are `True` and the others `False`

In [ ]:

- Create a standard deviation projection along the second dimension (columns) of `array_abs` . Check that the dimensions are the ones you expected. Also are the values around the value you expect?

In [ ]:

3. Plotting

- Use a line plot to plot `yarray` vs `xarray` :

In [ ]:

- Try to change the color of the plot to red and to have markers on top of the line as squares:

In [ ]:

- Plot the `normal_array` as an imagage and change the colormap to 'gray':

In [ ]:

- Assemble the two above plots in a figure with one row and two columns grid:

In [ ]:

4. Indexing

- Create new arrays where you select every second element from xarray and yarray. Plot them on top of `xarray` and `yarray` .

In [ ]:

- Select all values of `yarray` that are larger than 0. Plot those on top of the regular `xarray` and `yarray` plot.

In [ ]:

- Flip the order of `xarray` use it to plot `yarray` :

In [ ]:

5. Combining arrays

- Create an array filled with ones with the same shape as `normal_array` . Concatenate it to `normal_array` along the first dimensions and plot the result:

In [ ]:

- `yarray` represents a signal. Each line of `normal_array` represents a possible random noise for that signal. Using broadcasting, try to create an array of noisy versions of `yarray` using `normal_array`. Finally, plot it:

In [ ]:

```

```