Submit your work on Catcourses by February 3th at 11:59pm

Please be aware that in this homework, your approach and your justifications will be given **a lot** more importance than your final results. This means that you should think about how you will present and explain your work so that what you turn in makes sense, even if it is read by someone unfamiliar with the problem. This is a good training for your final report project.
Read entirely the homework assignment first !

1. Work on the exercises 1.3, 1.4, 1.5, 1.6 from the typed notes `Math150_Chapter1.pdf`

2. Suppose you have some set of observations, x_o, over time t, and a set x of predictions you made. In the file `hw1_data.csv` you will find data relevant for this exercise. Using Jupyter notebook and create a .ipynb called `hw1.ipynb`. You may load this data, and plot it, using the following commands:

```
%matplotlib inline
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import pandas as pd
from matplotlib.pyplot import plot as plt

file = 'hw1_data.csv'
df = pd.read_csv(file)
t = df.iloc[:,0]
x = df.iloc[:,1]
x0 = df.iloc[:,2]
fig, ax = plt.subplots(1, 1, figsize=(10,10))
ax.plot(t,x,'x', label = 'x')
ax.plot(t, x0,'+', label = 'x0')
plt.title('Observations and predictions')
ax.set_xlabel("t")
ax.set_ylabel("x values")
ax.legend()
```

   (a) Compare the observations and the predictions: what do you conclude ?

   (b) Find a model of the error $x(t) - x_0(t)$. Indicate all things you tried (explain your reasoning). You may try to plot different things, we expect a title, a legend and labels on each plots.

3. Submit on Catcourses your answers (including `hw1.ipynb`)under the assignment `Homework 1 (individual)`. You can scan handwritten answers for the exercises from the typed notes, or type them directly in the `hw1.ipynb` (Jupyter handles latex in markdown mode !).