SGN-13006 Introduction to Pattern Recognition and Machine Learning
TAU Computing Sciences
Exercise 1

Be prepared for the exercise sessions. You may ask TA questions regarding your solutions, but don't expect them to show you how to start from the scratch. Before the end of the session, demonstrate your solution to TA to receive exercise points.

1. **Fitting 2D linear model to $N > 2$ training points** (30 points)

   (a) You need to derive a learning method for the terms a and b, "learning parameters", of the linear model $y = ax + b$. The learning method for N training samples $\{(x_1, y_)), (x_2, y_2), \ldots, (x_N, y_N)\}$ (your training set) should be two closed form equations, one for a and another for b. We started the derivation during the lectures and this was your homework as well.

   (b) Implement a Matlab function *[a,b]=linfit(x,y)* that takes the training samples as inputs and returns the optimal values for the learning parameters. Use your own formula inside the function - no matter how "ugly" they are - to convince yourself about your correct derivation.

   (c) Implement a Matlab script *test_linfit.m* that asks some number of points from a user using a graphical user interface, draws the points and then draws the line of optimal fit.

   Hints: Try what the following does:

```
>> figure; axis([0 5 0 5]); ginput(5);
```