Reconocimiento de Patrones
Grado en Ingeniería Informática
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PRACTICE 1

EXERCISE 1: LINEAR REGRESSION

The data in the accompanying table relate heart rate at rest Y to kilograms body weight X.

x	90	86	67	89	81	75
y	62	45	40	55	64	53

a. Graph these data. Does it appear that there is a linear relation-ship between body weight and heart rate at rest?

b. Compute *a* and *b* and write the regression equation for these data. Plot the regression line on the graph from Part (a). Interpret the estimated regression coefficients.

c. Now examine the data point (67, 40). If this data point were removed from the data set, what changes would occur in the estimates of *a* and *b*?

d. Predict the heart rate for a particular subject weighing 88kg

e. Without doing the computations, for which measured X would the corresponding Y have the smallest variance? Why?

f. What would happen if you apply a polynomial fitting $y = a \cdot x^2 + b \cdot x + c$?

g. And computing this fitting $y = a \cdot x^3 + b \cdot x^2 + c \cdot x + d$?

h. Calculate the operation `y = 1./(y.*y)` to obtain a new vector and compute a new fitting `y = a * exp(-b * x)`

i. Calculate the operation `x2 = x/100; y2 = 3* x2 .* exp(2 * x2);` and compute a new fitting

$$y = C \cdot x \cdot e^{Ax}$$

What are the values of C and A? Does it seems to C = 3 and A = 2? Why not?

IMPORTANT: Plot the results in all cases.

EXERCISE 2: POLINOMIAL FUNCTIONS IN MATLAB

a) Calculate the paragraphs b), f), g), h) and i) using the following MATLAB functions:

   - polyfit: to calculate polynomial coefficients
   - polyval: to evaluate polynomials

b) Use the function *roots* to find the polynomial roots in 1f and 1g exercices