Homework #4: Minimal Squares

- Create a data file **graph.dat** which will contain two columns of data (x_i and y_i where $i = 1..N$) taken from one of your favorite laboratory experiments, in which the relation between x and y is supposed to be linear. i.e. of the form:

$$y(x) = ax + b \tag{1}$$

choose an experiment where a and b have some physical meaning.

- Write a program that uses the minimal squares method to obtain the best estimate of a and b from the data.

- For your convenience, the minimal squares methods gives:

$$
\begin{aligned}
a &= (NS_{xy} - S_x S_y)/A & (2) \\
b &= (S_{xx}S_y - S_{xy}S_x)/A & (3)
\end{aligned}
$$

$$
\begin{aligned}
S_\xi &\equiv \sum_{i=1}^{N} \xi_i & (4) \\
S_{\xi\eta} &\equiv \sum_{i=1}^{N} \xi_i \eta_i & (5) \\
A &= NS_{xx} - S_x^2 & (6)
\end{aligned}
$$

ξ, η can be x or y.

- Use $\sim$**compphys/plot** to display the graph and the line calculated by your program. Its syntax is as follows: $\sim$**compphys/plot a b filename**, where **a** is the fitted line's slope, **b** is its intercept with the y-axis and **filename** is the name of the file containing the data in the form of two columns. After viewing the graph press 'q' and "Enter" to quit.