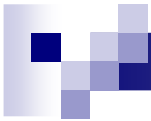


1.- Mitjana i desviació standard

2.- Recta de regressió

Càlcul utilitzant excel



Si tnehi moltes mesures:

La mitjana

$$\bar{x} = \frac{\sum_{i=1}^N x_i}{N}$$

La desviació standard

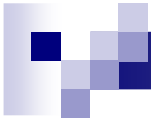
$$\sigma = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (\bar{x} - x_i)^2}$$

Resultat final:

$$x = \bar{x} \pm \mathcal{E}$$

$$\mathcal{E} = \sigma f$$

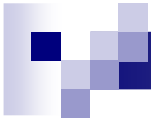
<i>N</i>	<i>f</i>	<i>N</i>	<i>f</i>	<i>N</i>	<i>f</i>	<i>N</i>	<i>f</i>
		11	0,6718	21	0,4552	40	0,3196
2	8,984	12	0,6354	22	0,4438	60	0,2586
3	2,484	13	0,6043	23	0,4324	120	0,1807
4	1,592	14	0,5775	24	0,4223	→ ∞	→ 0
5	1,241	15	0,5538	25	0,4128		
6	1,050	16	0,5329	26	0,4039		
7	0,9248	17	0,5142	27	0,3956		
8	0,8360	18	0,4973	28	0,3876		
9	0,7687	19	0,4820	29	0,3804		
10	0,7154	20	0,4680	30	0,3734		



1.- Mitjana i desviació standard

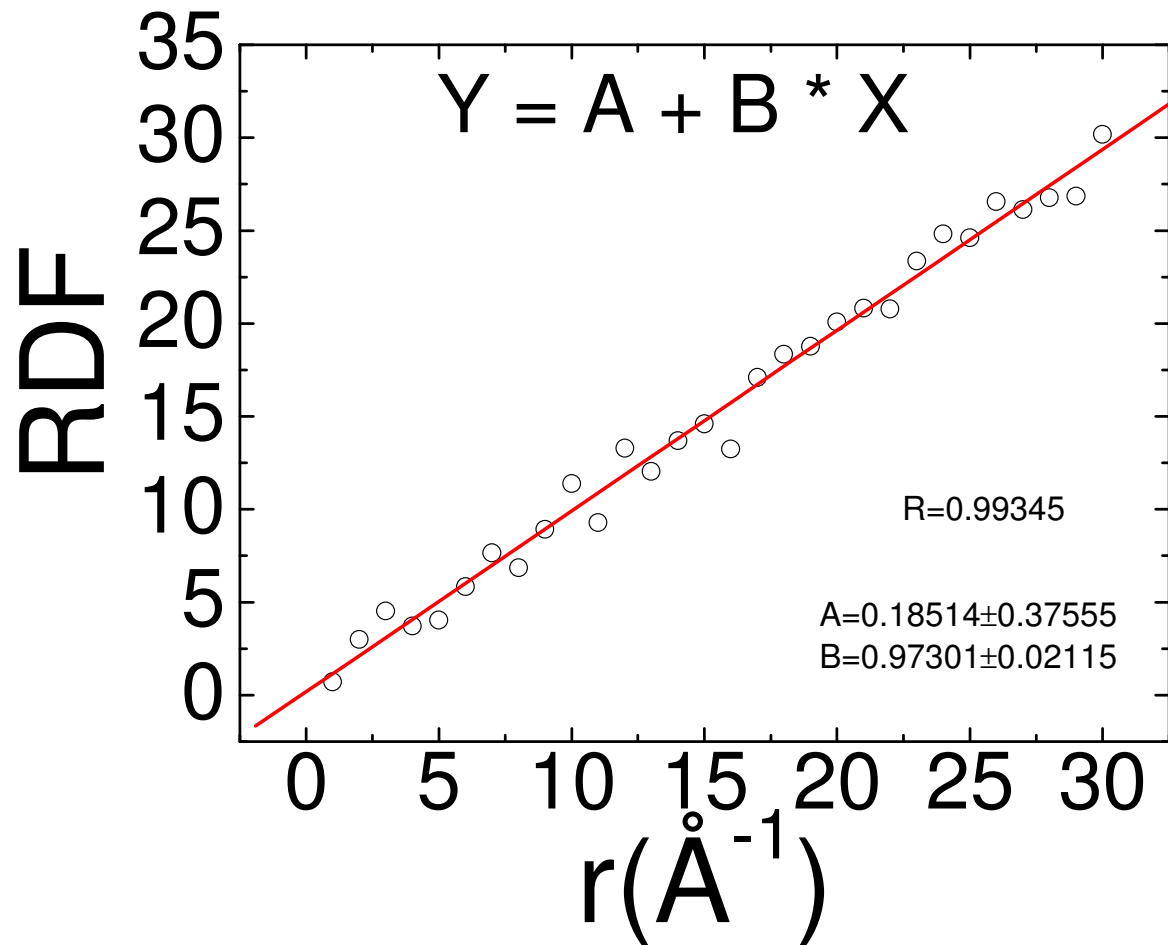
2.- Recta de regressió

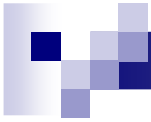
Càlcul utilitzant excel



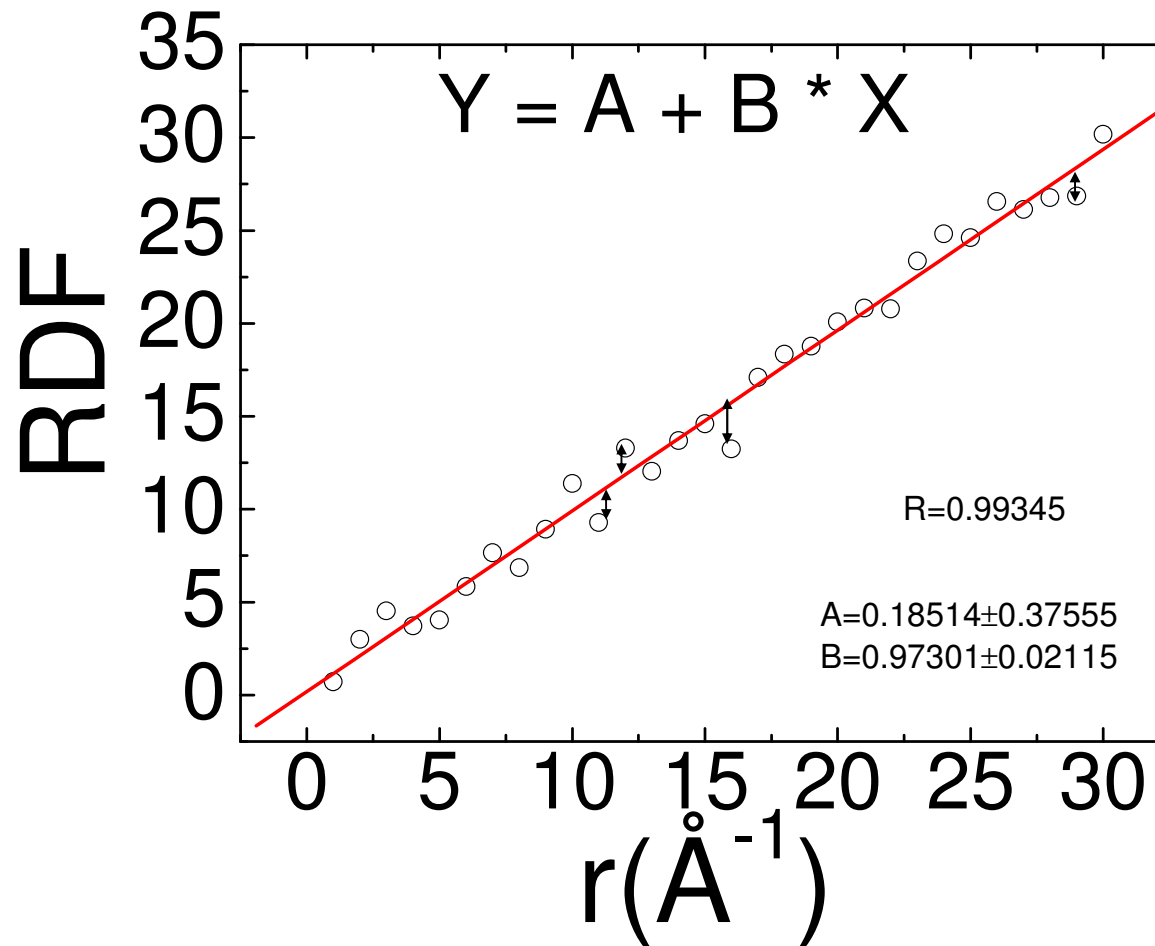
Objectiu

trobar la recta que millor s'ajusta a una funció, que descriu una hipòtesi





La millor recta es aquella en la que totes les distàncies dels punts a la recta son minimes



Cal minimitzar:

$$\chi^2(a,b) = \sum_{i=1}^N \underbrace{[y_i - (ax_i + b)]^2}_{\text{Distància de la recta al punt}}$$

Ajust d'una recta:

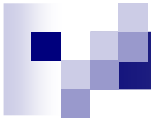
$$y = ax + b$$

Obtenim les següents equacions:

$$a = \frac{\overline{xy} - \bar{x}\bar{y}}{\overline{x^2} - \bar{x}^2} \quad \varepsilon_a = f\sigma_a \quad b = \bar{y} - a\bar{x} \quad \varepsilon_b = f\sqrt{\overline{x^2} - \bar{x}^2} \sigma_a$$

$$\begin{aligned} \bar{x} &= \frac{1}{N} \sum_{i=1}^N x_i & \bar{y} &= \frac{1}{N} \sum_{i=1}^N y_i & \overline{x^2} &= \frac{1}{N} \sum_{i=1}^N x_i^2 & \overline{xy} &= \frac{1}{N} \sum_{i=1}^N x_i y_i & r &= \frac{\overline{xy} - \bar{x}\bar{y}}{(\overline{x^2} - \bar{x}^2)\sqrt{\overline{y^2} - \bar{y}^2}} \\ \sigma_a &= \frac{a}{r} \sqrt{\frac{1-r^2}{N-2}} \end{aligned}$$

ARRRGGGHHH!!!!



1.- Mitjana i desviació standard

2.- Recta de regressió

Càlcul utilitzant excel

Ajust d'una recta:

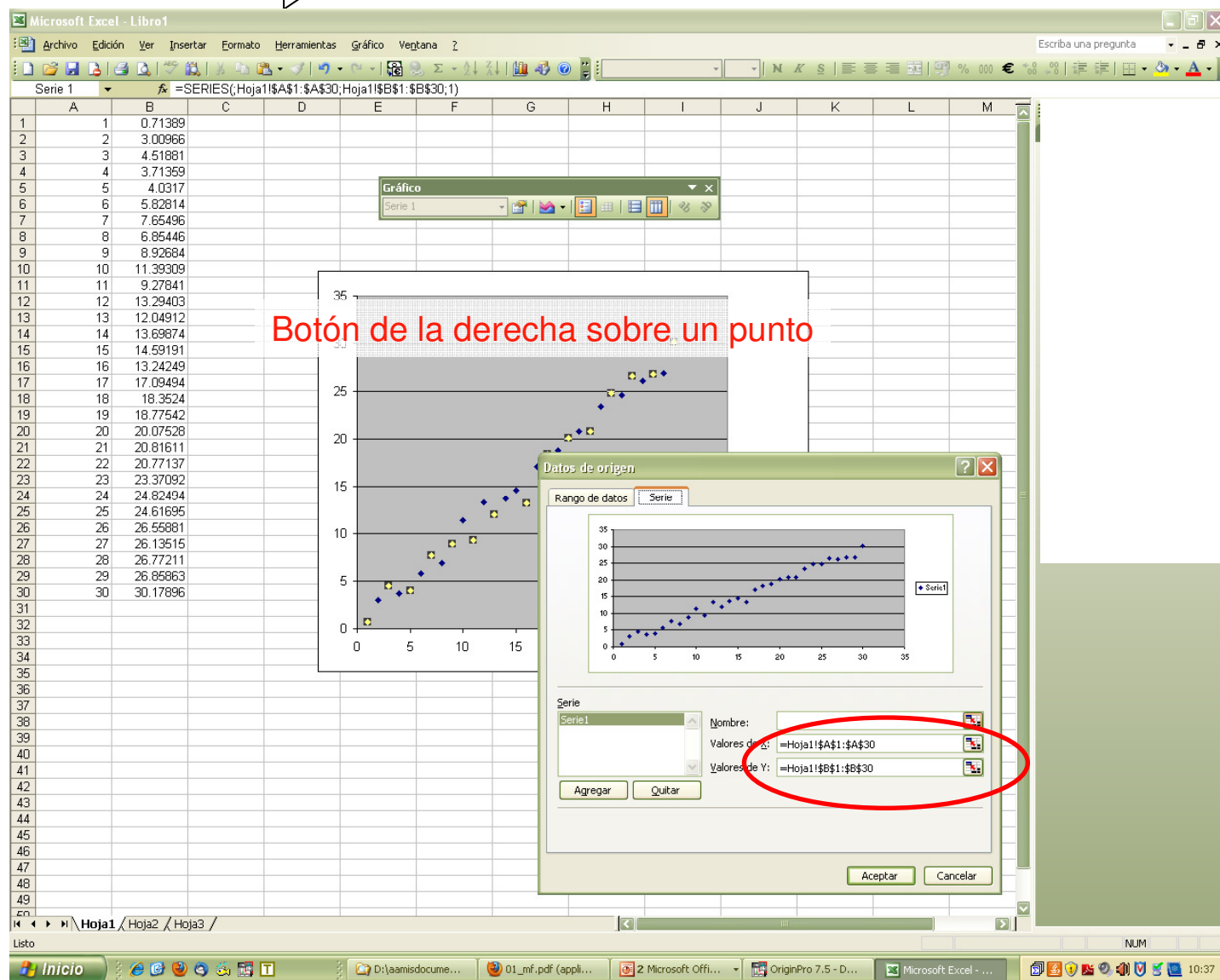
$$y = ax + b$$

The screenshot shows a Microsoft Excel spreadsheet with a data set for linear regression. The data is organized in two columns: Column A contains values from 1 to 30, and Column B contains corresponding values ranging from 0.71389 to 30.17896. The 'Asistente para gráficos' (Chart Wizard) dialog box is open, showing the 'Tipo de gráfico' (Chart type) section. The 'Lineas' (Lines) option is selected under 'Tipos estándar'. The 'Subtipo de gráfico' (Chart subtype) section shows four options, with the first one (a line with markers) selected. The 'Dispersión. Compara pares de valores.' (Scatter. Compare pairs of values.) description is visible. The 'Presionar para ver muestra' (Click to view sample) button is also present. The 'Siguiente >' (Next) button is highlighted with a red circle. The Excel interface includes the standard menu bar (Archivo, Edición, Ver, Insertar, Formato, Herramientas, Datos, Ventana) and the status bar at the bottom showing 'Suma=458.00183' and 'NUM'.

	A	B
1	1	0.71389
2	2	3.00966
3	3	4.51881
4	4	3.71359
5	5	4.0317
6	6	5.82814
7	7	7.65496
8	8	6.85446
9	9	8.92684
10	10	11.39309
11	11	9.27841
12	12	13.29403
13	13	12.04912
14	14	13.69874
15	15	14.59191
16	16	13.24249
17	17	17.09494
18	18	18.3524
19	19	18.77542
20	20	20.07528
21	21	20.81611
22	22	20.77137
23	23	23.37092
24	24	24.82494
25	25	24.61695
26	26	26.55881
27	27	26.13515
28	28	26.77211
29	29	26.85863
30	30	30.17896

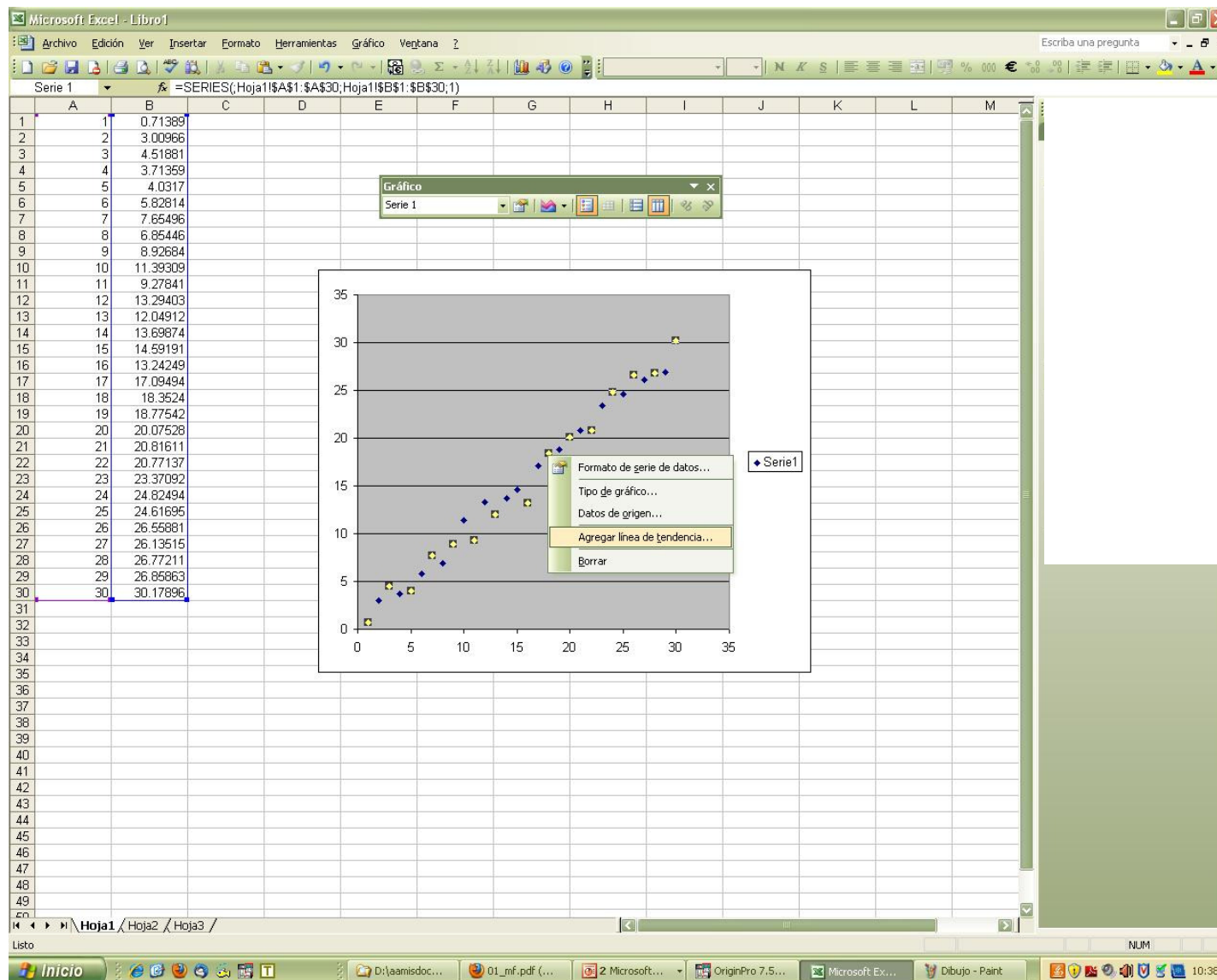
Ajust d'una recta:

$$y = ax + b$$



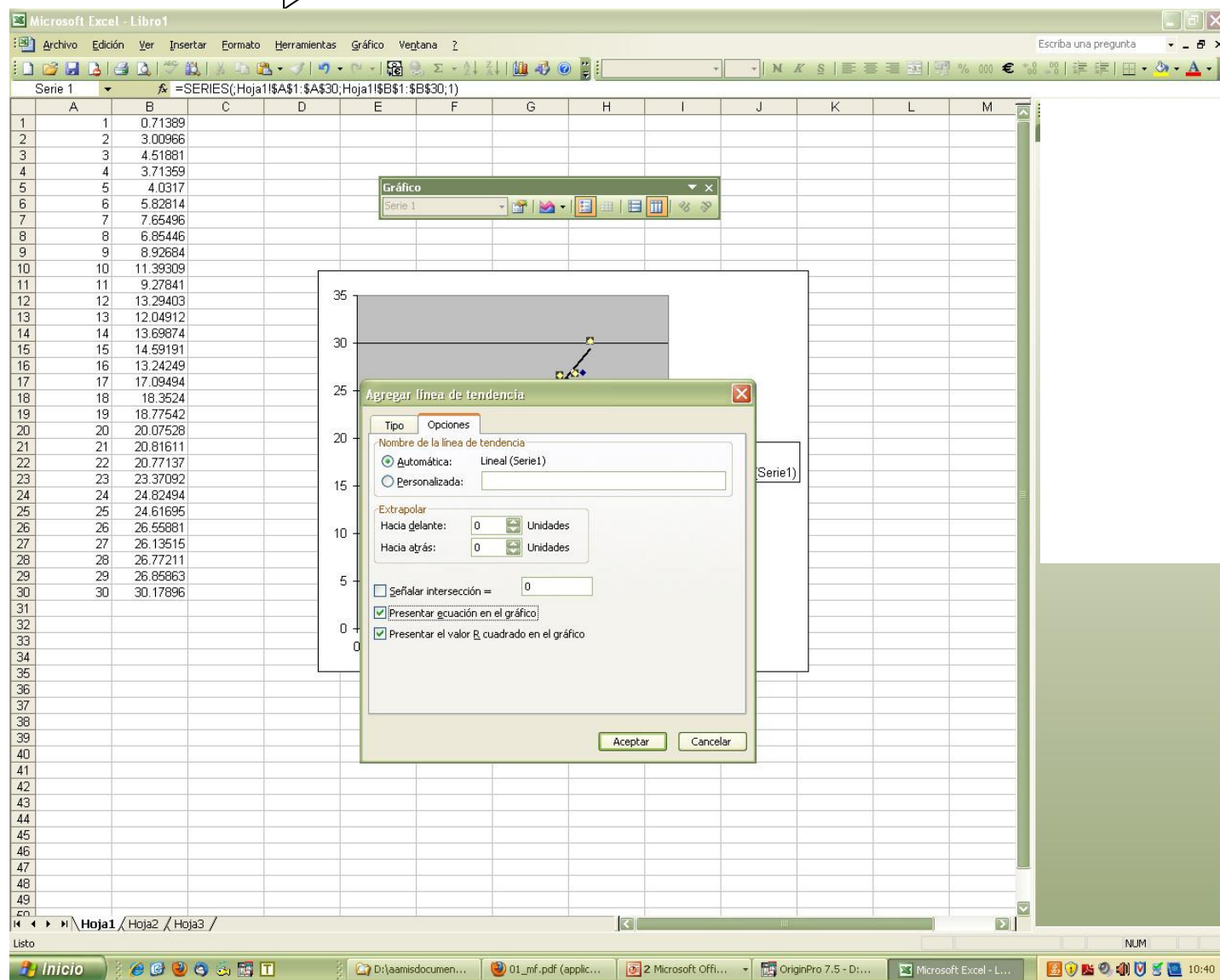
Ajust d'una recta:

$$y = ax + b$$



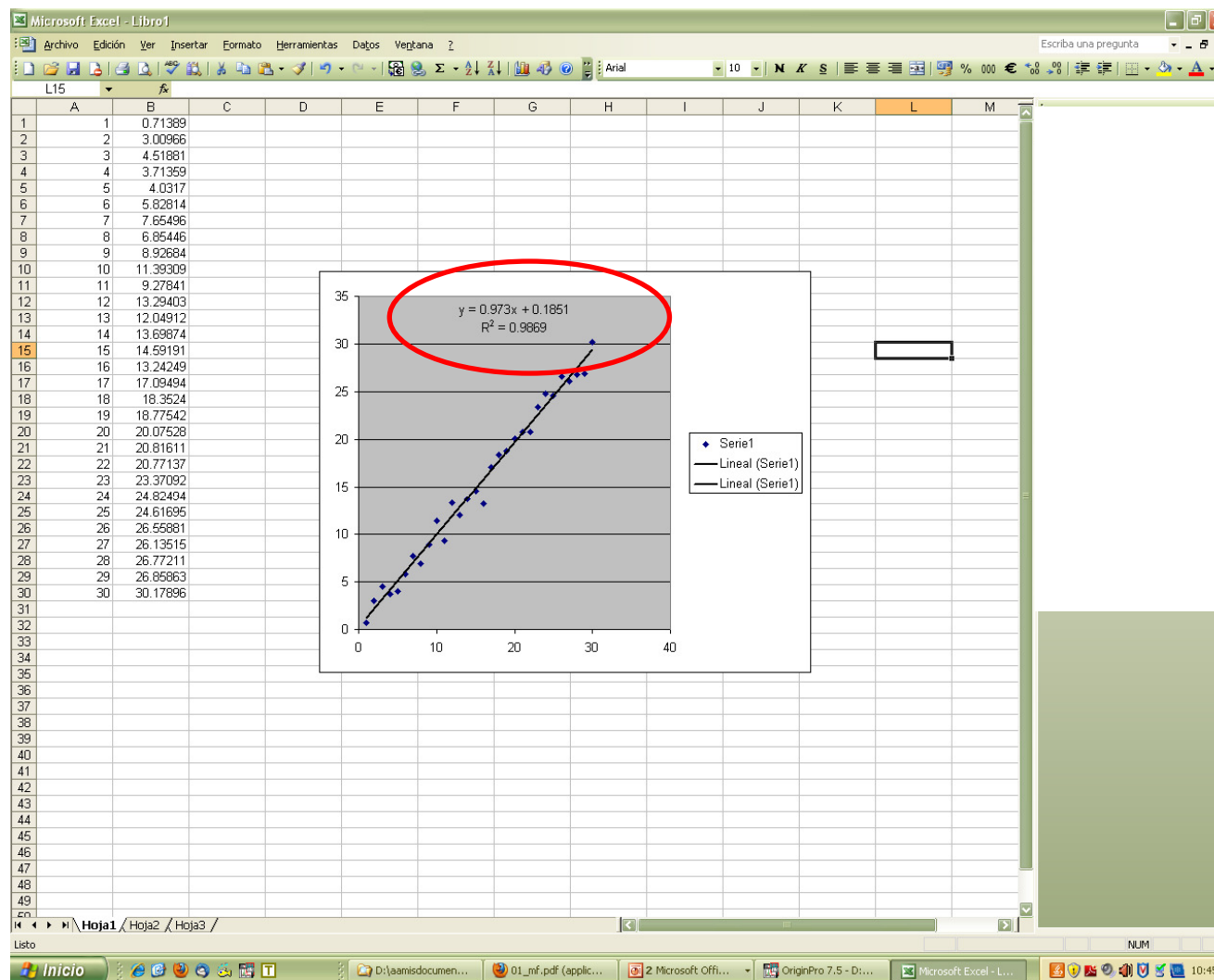
Ajust d'una recta:

$$y = ax + b$$



Ajust d'una recta:

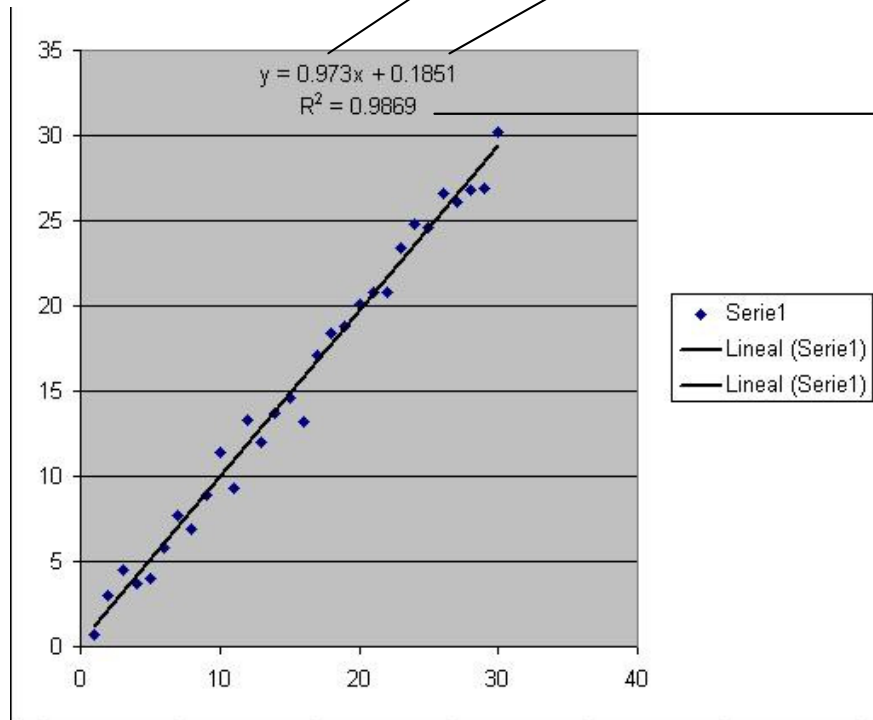
$$y = ax + b$$



Ajust d'una recta:

$$y = ax + b$$

Obtenim les següents equacions:



$$\sigma_a = \frac{a}{r} \sqrt{\frac{1-r^2}{N-2}}$$

$$\varepsilon_a = f \sigma_a$$

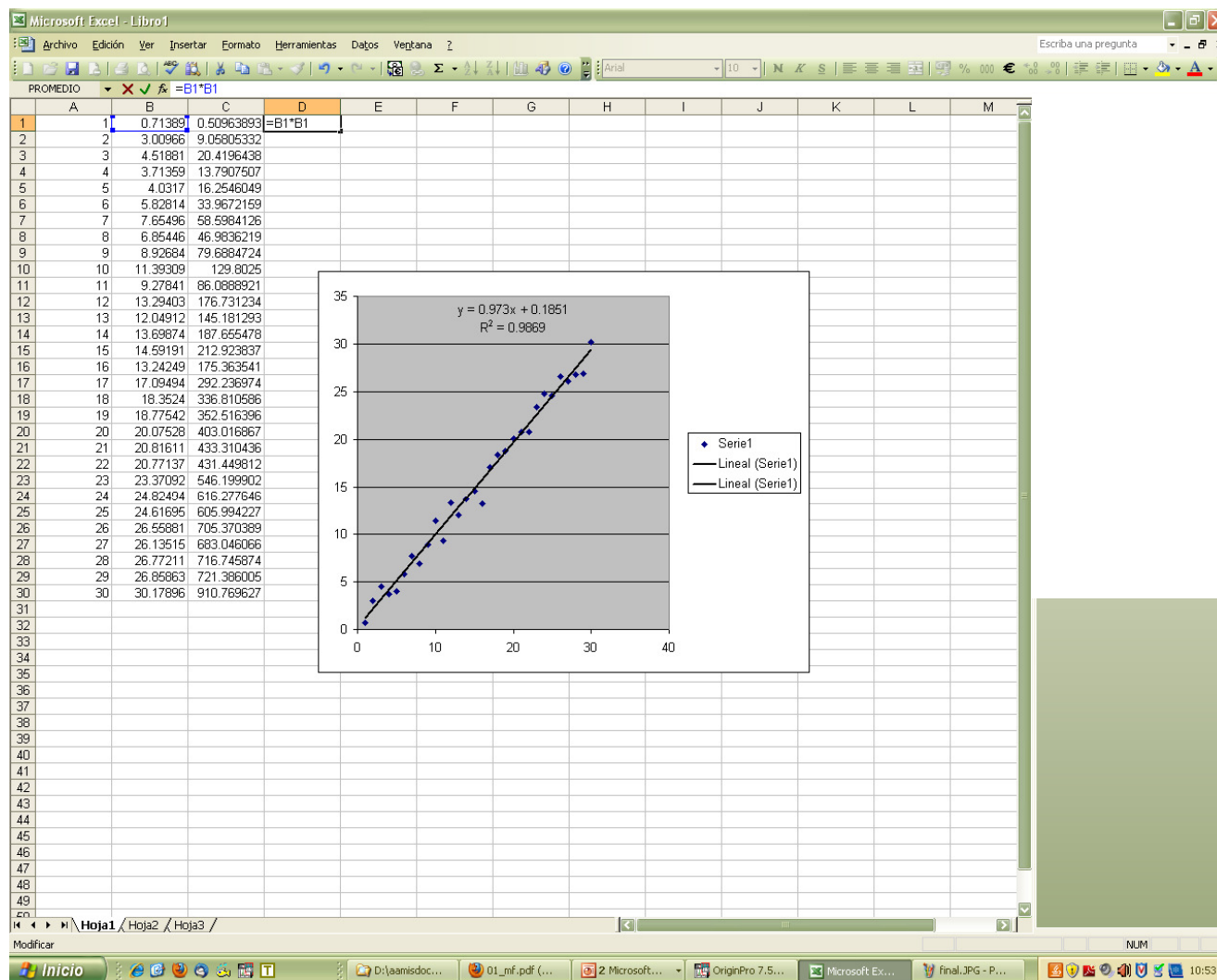
N	f	N	f	N	f	N	f
		11	0,6718	21	0,4552	40	0,3196
2	8,984	12	0,6354	22	0,4438	60	0,2586
3	2,484	13	0,6043	23	0,4324	120	0,1807
4	1,592	14	0,5775	24	0,4223	$\rightarrow \infty$	$\rightarrow 0$
5	1,241	15	0,5538	25	0,4128		
6	1,050	16	0,5329	26	0,4039		
7	0,9248	17	0,5142	27	0,3956		
8	0,8360	18	0,4973	28	0,3876		
9	0,7687	19	0,4820	29	0,3804		
10	0,7154	20	0,4680	30	0,3734		

$$\varepsilon_b = f \sqrt{x^2} \sigma_a$$

ARRGH! 2

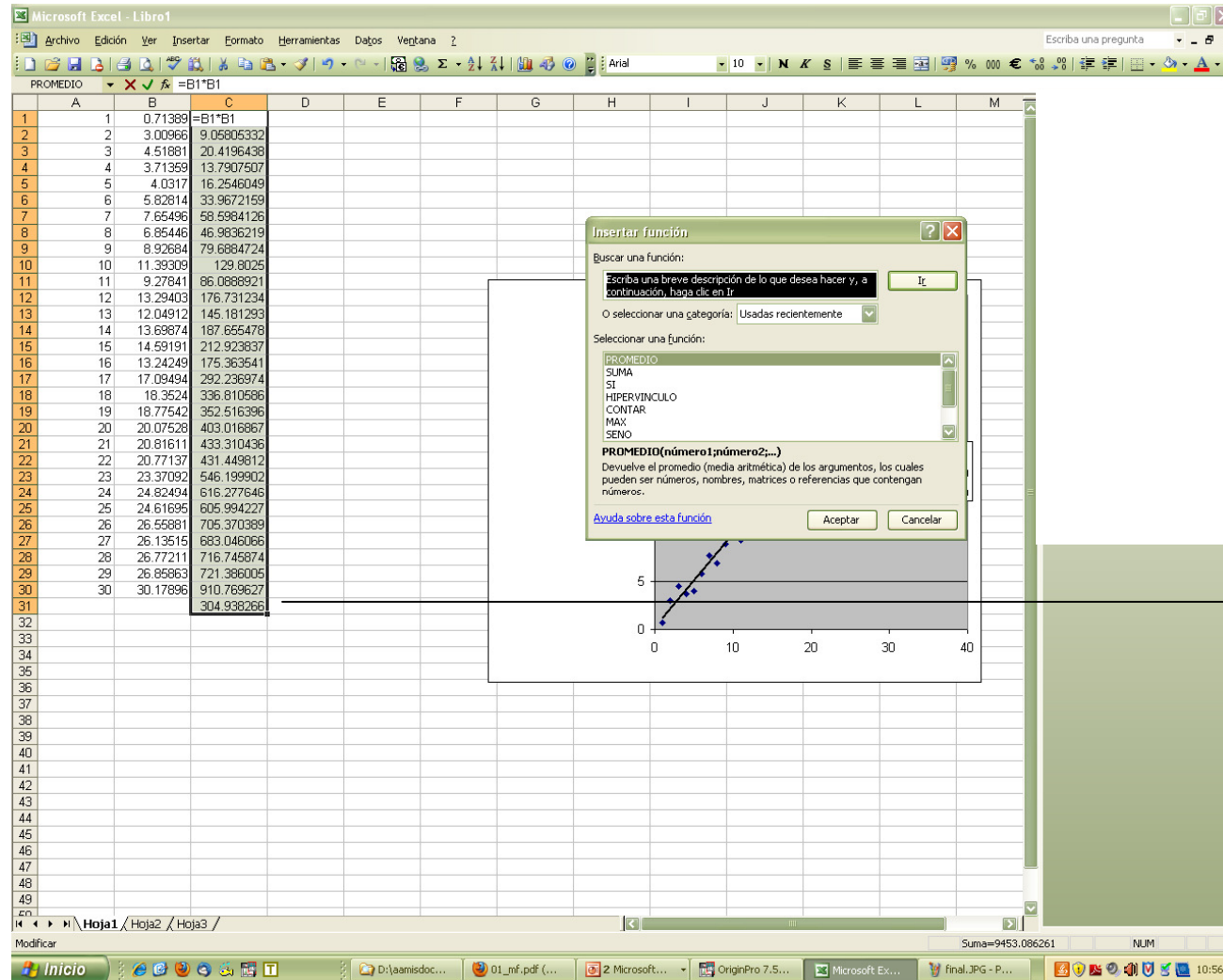
Ajust d'una recta:

$$y = ax + b$$



Ajust d'una recta:

$$y = ax + b$$



$$\overline{x^2}$$

$$\epsilon_b = f \sqrt{\overline{x^2}} \sigma_a$$