

Ejercicio 7

Peso (g) X	0	10	30	60	90	120	150	200	250	350
Alargamiento (cm) y	0	0'5	1	3	5	6'5	8	10'2	12'5	18

a) $y = a + b \cdot x$

$$a = \bar{y} - b \bar{x}$$

$$b = \frac{S_{xy}}{S_x^2}$$

$$S_{xy} = \frac{\sum x_i \cdot y_i \cdot n_{ij}}{N} - \bar{x} \cdot \bar{y}$$

$$S_x^2 = \frac{\sum x_i^2 \cdot f_i}{N} - \bar{x}^2 \quad \bar{x} = \frac{\sum x_i \cdot f_i}{N}$$

* Variable x:

x_i	f_i	$x_i \cdot f_i$	$x_i^2 \cdot f_i$
0	1	0	0
10	1	10	100
30	1	30	900
60	1	60	3600
90	1	90	8100
120	1	120	14400
150	1	150	22500
200	1	200	40000
250	1	250	62500
350	1	350	122500
$N=10$	$\Sigma=1260$	$\Sigma=274600$	

$$\bar{x} = \frac{1260}{10} = 126 \text{ kg}$$

$$S_x^2 = \frac{274600}{10} - 126^2$$

$$S_x^2 = 11.584 \text{ kg}^2$$

* Variable y:

$$\bar{y} = \frac{\sum y_i \cdot f_i}{N} = \frac{647}{10} = 6'47 \text{ cm}$$

* Covarianza:

$$S_{xy} = \frac{14110}{10} - 126 \cdot 6'57$$

$$S_{xy} = 583'18$$

Entón: $b = \frac{583'18}{11584} = 0'05$

$$a = 6'47 - 0'05 \cdot 126 \Rightarrow a = 0'17$$

$$\Rightarrow \underline{\underline{y = 0'17 + 0'05x}}$$

$$b) y = 0'17 + 0'05x$$

$$x = 100 \Rightarrow y = 0'17 + 0'05 \cdot 100 \Rightarrow y = 5'17 \text{ cm}$$

$$x = 500 \Rightarrow y = 0'17 + 0'05 \cdot 500 \Rightarrow y = 25'17 \text{ cm}$$

Ejercicio 8

Tiempo (h) x	0	1	2	3	4	5
Nº gérmenes y	20	26	33	41	47	53

$$y = a + bx \quad \begin{cases} b = \frac{S_{xy}}{S_x^2} \\ a = \bar{y} - b\bar{x} \end{cases}$$

$$\bar{x} = \frac{\sum x_i \cdot f_i}{N} = \frac{0+1+2+3+4+5}{6} = 2'5 \text{ horas}$$

$$S_x^2 = \frac{\sum x_i^2 \cdot f_i}{N} - \bar{x}^2 = \frac{1^2+2^2+3^2+4^2+5^2}{6} - 2'5^2 = 2'92 \text{ horas}^2$$

$$\bar{y} = \frac{\sum y_i \cdot f_i}{N} = \frac{20+26+33+41+47+53}{6} = 36'67 \text{ gérmenes/cm}^3$$

$$S_{xy} = \frac{\sum x_i \cdot y_i \cdot f_{ij}}{N} - \bar{x} \cdot \bar{y} = \frac{668}{6} - 2'5 \cdot 36'67 = 19'66$$

Entón:

$$b = \frac{19'66}{2'92} = 6'73$$

$$a = 36'67 - 6'73 \cdot 2'5 = 19'85$$

$$\Rightarrow y = 19'85 + 6'73x$$

$$b) y = 19'85 + 6'73x$$

$$x = 6 \Rightarrow y = 19'85 + 6'73 \cdot 6 = 60'23 \text{ gérmenes/cm}^3$$

$$r_{xy} = \frac{S_{xy}}{S_x \cdot S_y}$$

$$r_{xy} = \frac{19'66}{1'71 \cdot 11'52} = 0'998$$

Muy buena predicción.

$$S_x = \sqrt{S_x^2} = \sqrt{2'92} = 1'71 \text{ horas}$$

$$S_y^2 = \frac{\sum y_i^2 \cdot f_{ij}}{N} - \bar{y}^2 = \frac{8864}{6} - 36'67^2 = 132'64 \Rightarrow S_y = \sqrt{132'64} = 11'52$$