Punto #6 Mínimos cuadrados

$$X^2(a_0,a_1)=\sum_{i=1}^{n}(y_i-(a_0+a_1x_i))^2 = y_i^2-2y_i(a_0+a_1x_i)+(a_0+a_1x_i)^2$$

$$=y_i^2-2y_ia_0+2y_ia_1x_i+a_0^2+2a_0a_1x_i+a_1^2x_i^2$$

$$X^2(a_0,a_1)=\sum y_i^2-2a_0\sum a_i-2a_1\sum y_ix_i+\cdots+a_0^2\sum x_i^2$$

Ahora

$$\frac{\partial X^2}{\partial a_0}=-2\sum y_i-a_1\sum x_i=\vec{y_i}-a_i\vec{x_i}=\sum y_i\ a_i\sum x_i=\vec{y_i}-a_i\vec{x_i}$$

$$\frac{\partial X^2}{a_0}=2\sum y_ix_i+2a_i\sum x_i+2a_i\sum x_i^2=0=-\sum y_ix_i+(\sum y_i\sum x_i-a_i\sum x_i\sum x_i)$$
$$+a_i\sum x_i^2=0$$

minimizamos

$$X^2(a_0,a_1,a_2)=\sum_{i=1}^{n}(y-(a_0+a_ix_i+a_2x_i^2))^2$$

$$*\frac{\partial X^2}{\partial a_0}=-2\sum y_i+2na_0+2a_i\sum x_i+2a_2\sum x_i^2=0$$

$$\sum_{i=1}^{n}[a_0+a_1x_1+a_2x_i^2]\cdot\frac{y_i}{N}=\boxed{\vec{y_i}}$$

$$*\frac{\partial X^2}{\partial a_1}=-2[y_ix_i+2a_i\sum x_i^2+2a_2\sum x_i^3=0$$

$$\sum_{i=1}^{n}[a_0x_i+a_1x_i^2+a_2x_i^3]=\frac{y\cdot x_i}{N}=\vec{x_iy_i}$$

$$*\frac{\partial X^2}{\partial a_2}=-2\sum y_ix_i^2+2a_1\sum x_i^3+2a_2\sum x_i^4=0$$

$$\sum_{i=1}^{n}[a_0x_i^2+a_1x_i^3+a_2x_i^4]=\frac{x_i^2y_i}{N}=\vec{x_i^2y_i}$$