Mínimos cuadrados 6:

a) $\frac{d\chi^2}{da_0} = 0 = -2\sum_{i=1}^{n}(y_i - a_0 - a_1 x_i)$

$0 = \sum_{i=1}^{n}(y_i - a_0 - a_1 x_i) \rightarrow \underline{a_0 = \sum_{i=1}^{n} y_i - a_1 \sum_{i=1}^{n} x_i = \bar{y}_i - a_1 \bar{x}_i}$

$\frac{d\chi^2}{da_1} = 0 = -2\sum_{i=1}^{n} a_1(y_i - a_0 - a_1 x_i) = -2\sum_{i=1}^{n}(a_1 y_i - a_1 a_0 - a_1^2 x_i)$

$\sum_{i=1}^{n}(a_1 y_i - a_1 \sum_{i=1}^{n} y_i - a_1^2 \sum_{i=1}^{n} x_i - a_1^2 x_i) = 0$

$a_1 \sum_{i=1}^{n} y_i - a_1 \sum_{i=1}^{n}\sum_{i=1}^{n} y_i - a_1^2 \sum_{i=1}^{n}\sum_{i=1}^{n} x_i - a_1^2 \sum_{i=1}^{n} x_i = 0$

$= a_1(\sum y_i - \sum\sum y_i) - a_1^2(\sum\sum x_i + \sum x_i) \cancel{a_1(\sum x - \frac{\sum y}{n}) + a_1^2(\frac{\sum x_i}{n} + \sum x_i) + 0}$

$0 = a_1^2(\frac{\sum x_i}{n} + \sum x_i) - a_1(\sum y_i - \frac{\sum y_i}{n})$

$-a_1 = \frac{-\sum y_1 + \frac{\sum y_1}{n} - \sum y_1 + \frac{\sum y_1}{n}}{2(\frac{\sum x_i}{n} + \sum x_i)} = \frac{\frac{\sum y_i}{n} - \sum y_i}{\frac{\sum x_i}{n} + \sum x_i} \cdot \frac{\sum x_i}{\sum x_i} = \frac{\frac{\sum x \sum y_1}{n} - \sum y_1 x_1}{\frac{(\sum x_i)^2}{n} - \sum x_i^2}$

$\underline{a_1 = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}}$

b) $\chi^2(a_0, a_1, a_2) = 0 = \sum_{i=1}^{n}(y_i - (a_0 + a_1 x_i + a_2 x_i^2))^2 \rightarrow$ podemos deshacernos del exponente.

$\sum(y_i - a_0 - a_1 x_i - a_2 x_i^2) = 0 \rightarrow \sum_{i=1}^{n}[y_i = a_0 + a_1 x_i + a_2 x_i^2]$

Para calcular las 3 incognitas necesitamos 3 ecuaciones linealmente independientes. Podemos lograr esto multiplicando por x_i, y x_i^2. Entonces:

$\sum_{i=1}^{n}[y_i = a_0 + a_1 x_i + a_2 x_i^2]$
$\sum_{i=1}^{n}[x_i y_i = a_0 x_i + a_1 x_i^2 + a_2 x_i^3]$
$\sum_{i=1}^{n}[x_i^2 y_i = a_0 x_i^2 + a_1 x_i^3 + a_2 x_i^4]$

El proceso sirve para todos los grados!