$$\frac{\partial x^2}{\partial \theta} = \sum \frac{\partial}{\partial \theta}\left[(y_i - (a_i x_i + a_0))^2 \right]$$

$$\sum (y_i - (a_i x_i + a_0)) = 0$$

$$\sum_i^N y_i - \sum_i^N a\, x_i + \sum_i^N a_0 = 0$$

$$\bar{y} - a_i \bar{x} - a_0 = 0$$

$$a_0 = \bar{y} - a_i \bar{x}$$

$$\frac{\partial x^2}{\partial a_i} = \sum_i^N \frac{\partial}{\partial a_i}\left[y_i - (a_i x_i + a_0)^2 \right] = 0$$

① $$\sum_i^N x_i y_i - a_i \sum_i^N x_i^2 + a_0 \sum_i^N x_i = 0$$

② $$-2 \sum_i x_i y_i + a_i \sum_i x_i^2 \left[\frac{-1}{N} \sum y_i - \frac{a_i}{N} \sum x_i \right] \sum_i^N x_i = 0$$

① = ②

Por tanto:

$$a_i = \frac{2 \sum_i^N x_i y_i - \frac{1}{N} \sum_i^N x_i \sum_i^N y_i}{\sum x_i^2 - \frac{1}{N} \left(\sum_i x_i \right)^2}$$

- $$\frac{\partial x^2}{\partial a_0} = \sum_i \left[\frac{\partial}{\partial a_0} \left[(y_i - (a_0 + a_1 x_i + a_2 x^2))^2 \right] \right]$$

$$\sum_{i=1}^{N} \left[a_0 + a_1 x_1 + a_2 x^2 = y_i \right]$$

- $$\frac{\partial x^2}{\partial a_1} = \sum_i \left[\frac{\partial}{\partial a_1} (y_1 - (a_0 + a_1 x_1 + a_2 x^2))^2 \right]$$

$$= \sum_{i=1}^{N} \left[a_0 x_1 + a_1 x_1^2 + a_2 x_1^3 = x_1 y_1 \right]$$

- $$\frac{\partial x^2}{\partial a_2} = \sum_i \left[\frac{\partial}{\partial a_2} (y_i - (a_0 + a_1 x_i + a_2 x^2))^2 \right]$$

$$= \sum_{i=1}^{N} \left[a_0 x_1^2 + a_1 x_1^3 + a_2 x_1^4 = x_1^2 y_1 \right]$$