Teniendo la función de costo

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

las expresiones para a_0 y a_1 se pueden hallar de la siguiente manera

$$\frac{\partial X^2}{\partial a_0} = -2\sum_{i=1}^{n} (y_i - (a_0 + a_1 x_i)) = 0$$

$$\frac{\partial X^2}{\partial a_1} = -2\sum_{i=1}^{n} x_i (y_i - (a_0 + a_1 x_i)) = 0$$

Para a_0

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

Tomando el valor promedio de x y y, $\bar{x}$ e $\bar{y}$, se obtiene

$$-2(\bar{y} - (a_0 + a_1 \bar{x})) = 0$$

$$-2\bar{y} + 2a_0 + 2a_1\bar{x} = 0$$

$$\cancel{2}a_0 + \cancel{2}a_1\bar{x} = \cancel{2}\bar{y}$$

$$a_0 = \bar{y} - a_1\bar{x}$$

Para a_1

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

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

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

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

$$\cancel{2}a_1\left(\sum_{i=1}^{n} x_i^2 - \sum_{i=1}^{n} x_i \bar{x}\right) = \cancel{2}\sum_{i=1}^{n} x_i\,(y_i - \bar{y})$$

$$a_1 = \frac{\sum_{i=1}^{n} x_i(y_i - \bar{y})}{\sum_{i=1}^{n} x_i^2 - \sum_{i=1}^{n} x_i \bar{x}}$$

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