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

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

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

$$n a_0 = \sum y - a_1 \sum x$$

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

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

$$0 = \sum \left(y_i x_i - a_0 x_i + a_1 x_i^2\right)$$

$$\sum (a_1 x^2) = \sum (x_i y_i - a_0 x_i)$$

$$a_1 \Sigma x^2 = \Sigma xy - a_0 \Sigma x$$

$$a_1 \Sigma x^2 = \Sigma xy - \Sigma x\left(\frac{\Sigma y}{n} - a_1 \frac{\Sigma x}{n}\right)$$

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

$$a_1 \left(\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right) = \Sigma xy - \frac{\Sigma x \Sigma y}{n}$$

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

$$\chi^2(a_0, a_1, a_2) = \sum_{i=1}^{n} \left(y_i - (a_0 + a_1 x_i + a_2 x_i^2)\right)^2$$

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

$$0 = \sum_{i=1}^{n} \left(y_i - (a_0 + a_1 x_i + a_2 x_i^2)\right)$$

$$\sum_{i=1}^{n} \left(a_0 + x_i a_1 + x_i^2 a_2 = y_i\right)$$

$$0 = \sum_{i=1}^{n} 2\left(y_i - (a_0 + x_i a_1 + x_i^2 a_2)\right)(-x_i)$$

$$0 = \sum_{i=1}^{n} \left(y_i - (a_0 + x_i a_1 + x_i^2 a_2)\right)(x_i)$$

$$\sum_{i=1}^{n} \left(y_i x_i = a_0 x_i + a_1 x_i^2 + a_2 x_i^3\right)$$

$$0 = \sum_{i=1}^{n} 2\left(y_i - a_0 + x_i a_1 + x_i^2 a_2\right)\left(-x_i^2\right)$$

$$0 = \sum_{i=1}^{n} \left(y_i - (a_0 + x_i a_1 + x_i^2 a_2)\right)(x_i^2)$$

$$\sum_{i=1}^{n} \left(x_i^2 y_i = a_0 x_i^2 + a_1 x_i^3 + a_2 x_i^4 \right)$$