

## Chemometrics

### Solution 1.

At the minimum the first derivative with respect to  $\bar{x}$  is zero:

$$\frac{d}{d\bar{x}} \sum_{i=1}^n (x_i - \bar{x})^2 = 0$$

$$\sum_{i=1}^n \frac{d}{d\bar{x}} (x_i - \bar{x})^2 = 0$$

Chain rule:

$$\sum_{i=1}^n 2(x_i - \bar{x}) \frac{d}{d\bar{x}} (x_i - \bar{x}) = 0$$

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

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

$$\sum_{i=1}^n (x_i - \bar{x}) = 0$$

$$\sum_{i=1}^n x_i - \sum_{i=1}^n \bar{x} = 0$$

$$\sum_{i=1}^n \bar{x} = \sum_{i=1}^n x_i$$

$$n\bar{x} = \sum_{i=1}^n x_i$$

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$