For $N$ repeated measurements of quantities $x_i$

\[ \text{mean=average='best'=x bar } X = \frac{1}{N} \sum_{i=1}^{N} x_i \]

Variance = $\frac{1}{N} \sum (x_i - X)^2$

Standard deviation of $x = \sigma_x = \sqrt{\sum (x_i - X)^2} \quad N-1$

= $\sqrt{\frac{N}{N-1} \times \text{variance}}$

Measures of width, scatter, of data.

SDOM=Standard Deviation Of the Mean
\[ = \sigma_x / \sqrt{N} = \sigma_{xbar} \rightarrow \delta x \]

If the measurements $x_i$ are collected into ‘bins’ for a histogram, sum over the bins and their contents, as a shorter list of terms to add up.