**Standard Deviation**

\[ s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}} \]

- \( s \) = sample standard deviation
- \( \bar{x} \) = sample mean
- \( \Sigma \) = summation
- \( n \) = sample size
- \( x_i \) = the \( i \)th member of the sample

**Standard Error of the Mean**

\[ SEM = \frac{s}{\sqrt{n}} \]

- \( SEM \) = standard error of the mean
- \( s \) = sample standard deviation
- \( n \) = sample size

**Propagation of Error**

\[ s_u = \sqrt{\left( \frac{\partial u}{\partial x} \right)^2 s_x^2 + \left( \frac{\partial u}{\partial y} \right)^2 s_y^2 + \left( \frac{\partial u}{\partial z} \right)^2 s_z^2} \]

- \( u \) = function of physical property; \( f(x, y, z, \ldots) \)
- \( s_u \) = uncertainty/standard deviation of function \( u \)

\[ x = \text{measured variable} \]
\[ y = \text{measured variable} \]
\[ z = \text{measured variable} \]

- \( \frac{\partial u}{\partial x} \) = derivative of function \( u \) with respect to variable \( x \)
- \( \frac{\partial u}{\partial y} \) = derivative of function \( u \) with respect to variable \( y \)
- \( \frac{\partial u}{\partial z} \) = derivative of function \( u \) with respect to variable \( z \)

\[ s_x = \text{uncertainty/standard deviation of variable } x \]
\[ s_y = \text{uncertainty/standard deviation of variable } y \]
\[ s_z = \text{uncertainty/standard deviation of variable } z \]