

Replicate Error Worksheet

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This worksheet guides the user through the calculation of the standard error and 95% confidence interval on a quantity that has been measured n times (replicated). The replicate-error-related standard error e_s may subsequently be used in propagation-of-error calculations of derived quantities.

Replicated Variable, Y :					Units:			
Measured values Y_1, Y_2, \dots, Y_n		Sample Mean, \bar{Y}	Sample Variance, s^2	Sample Standard Deviation, s	Standard Error, $e_s = \frac{s}{\sqrt{n}}$	95% Confidence Interval based on n replicates (<i>Student's t</i> distribution)		
Y_1						$n = 1$	n/a	(include units) \pm
Y_2						$n = 2$	$\pm 12.7e_s$	
Y_3						$n = 3$	$\pm 4.30e_s$	
Y_4						$n = 4$	$\pm 3.18e_s$	
Y_5						$n = 5$	$\pm 2.78e_s$	
Y_6						$n = 6$	$\pm 2.57e_s$	
Y_7						$n \geq 7$	$\pm 2e_s$	
						∞	$\pm 1.96e_s$	

$$\bar{Y} \equiv \frac{1}{n} \sum_{i=1}^n Y_i$$

$$s^2 \equiv \frac{1}{(n-1)^2} \sum_{i=1}^n (Y_i - \bar{Y})^2$$