

Comparative Statistics

This worksheet calculates comparative statistics for two data sets. Includes; average, standard deviation (N and N-1 weighted), and confidence intervals for each data set, and t-test for comparison of means.

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	Set #1	Set #2		
Number of measurements:	$N_1 := 20$	$N_2 := 20$	$i := 0, 1..N_1 - 1$	$j := 0, 1..N_2 - 1$
Data Points:	$X_{1,i} :=$	$X_{2,j} :=$		
	25.160	25.160		
	25.227	25.227		
	24.402	24.402		
	23.924	23.924		
	20.730	20.730		
	23.615	23.615		
	23.648	23.648		
	23.747	23.747		
	23.613	23.613		
	22.910	22.910		
	25.075	25.075		
	24.301	24.301		
	24.611	24.611		
	25.133	25.133		
	24.152	24.152		
	24.196	24.196		
	24.775	24.775		
	23.841	23.841		
	24.883	24.883		
	25.561	25.561		

Data Analysis:

Set #1:

AVERAGE	$x_1 := \sum_i \frac{X_{1,i}}{N_1}$	$x_1 = 24.1752$
STD (N)	$\sigma_1 := \sqrt{\left[\sum_i (X_{1,i} - x_1)^2 \right] \cdot (N_1)^{-1}}$	$\sigma_1 = 1.03872$
STD (N-1)	$s_1 := \sqrt{\left[\sum_i (X_{1,i} - x_1)^2 \right] \cdot (N_1 - 1)^{-1}}$	$s_1 = 1.0657$
CI := 90·%	$s_m(CI) := qt\left(CI + \frac{1 - CI}{2}, N_1 - 1\right) \cdot \frac{s_1}{\sqrt{N_1}}$	$s_m(CI) = 0.41205$

Set #2:

AVERAGE	$x_2 := \sum_j \frac{X_{2,j}}{N_2}$	$x_2 = 24.1752$
STD (N)	$\sigma_2 := \sqrt{\left[\sum_j (X_{2,j} - x_2)^2 \right] \cdot (N_2)^{-1}}$	$\sigma_2 = 1.03872$
STD (N-1)	$s_2 := \sqrt{\left[\sum_j (X_{2,j} - x_2)^2 \right] \cdot (N_2 - 1)^{-1}}$	$s_2 = 1.0657$
CI := 90·%	$s_m(CI) := qt\left(CI + \frac{1 - CI}{2}, N_2 - 1\right) \cdot \frac{s_2}{\sqrt{N_2}}$	$s_m(CI) = 0.41205$

Comparing data sets:

Pooled Std:	$s_{\text{pooled}} := \sqrt{\frac{\sum_i (X_{1,i} - x_1)^2 + \sum_j (X_{2,j} - x_2)^2}{N_1 + N_2 - 2}}$	$s_{\text{pooled}} = 1.0657$
$t_{\text{experimental}}$	$t_{\text{experimental}} := \frac{ x_1 - x_2 }{s_{\text{pooled}} \sqrt{\frac{1}{N_1} + \frac{1}{N_2}}}$	$t_{\text{experimental}} = 0$
t_{critical} :	CI := 95·%	$qt\left[CI + \frac{1 - CI}{2}, (N_1 + N_2) - 2\right] = 2.02439$