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) $\sigma_1 := \sqrt{\left[\sum_i \left(X_{1,i} - x_1\right)^2\right] \cdot \left(N_1\right)^{-1}}$ $\sigma_1 = 1.03872$

STD (N-1) $s_1 := \sqrt{\left[\sum_i \left(X_{1,i} - x_1\right)^2\right] \cdot \left(N_1 - 1\right)^{-1}}$ $s_1 = 1.0657$

$CI := 90 \cdot \%$ $s_m(CI) := qt\left(CI + \frac{1 - CI}{2}, N_1 - 1\right) \cdot \frac{s_1}{\sqrt{N_1}}$ $s_m(CI) = 0.41205$

Set #2:

AVERAGE $x_2 := \sum_j \frac{X_{2,j}}{N_2}$ $x_2 = 24.1752$

STD (N) $\sigma_2 := \sqrt{\left[\sum_j \left(X_{2,j} - x_2\right)^2\right] \cdot \left(N_2\right)^{-1}}$ $\sigma_2 = 1.03872$

STD (N-1) $s_2 := \sqrt{\left[\sum_j \left(X_{2,j} - x_2\right)^2\right] \cdot \left(N_2 - 1\right)^{-1}}$ $s_2 = 1.0657$

$CI := 90 \cdot \%$ $s_m(CI) := qt\left(CI + \frac{1 - CI}{2}, N_2 - 1\right) \cdot \frac{s_2}{\sqrt{N_2}}$ $s_m(CI) = 0.41205$

Comparing data sets:

Pooled Std: $s_{pooled} := \sqrt{\frac{\sum_i \left(X_{1,i} - x_1\right)^2 + \sum_j \left(X_{2,j} - x_2\right)^2}{N_1 + N_2 - 2}}$ $s_{pooled} = 1.0657$

$t_{experimental}$ $t_{experimental} := \frac{\left|x_1 - x_2\right|}{s_{pooled} \cdot \sqrt{\frac{1}{N_1} + \frac{1}{N_2}}}$ $t_{experimental} = 0$

$t_{critical}$: $CI := 95 \cdot \%$ $qt\left[CI + \frac{1 - CI}{2}, \left(N_1 + N_2\right) - 2\right] = 2.02439$