Statistical Analysis for data set 1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| F-Test Two-Sample for Variances(1b average) | | | | | F-Test Two-Sample for Variances(1b best) | | |
|  |  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  |  | *Variable 1* | *Variable 2* |
| Mean | -2.35037 | -1.75014 |  |  | Mean | -2.04678 | -1.34177 |
| Variance | 0.010094 | 0.012725 |  |  | Variance | 0.018098 | 0.006409 |
| Observations | 30 | 30 |  |  | Observations | 30 | 30 |
| df | 29 | 29 |  |  | df | 29 | 29 |
| F | 0.793274 |  |  |  | F | 2.823723 |  |
| P(F<=f) one-tail | 0.268441 |  |  |  | P(F<=f) one-tail | 0.003335 |  |
| F Critical one-tail | 0.5374 |  |  |  | F Critical one-tail | 1.860811 |  |

Abs(mean(Variable 1) < mean(Variable2)) Abs(mean(Variable 1) > mean(Variable2))

and F > F critical and F < F critical

Therefore assume equal variances Therefore assume equal variances

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| t-Test: Two-Sample Assuming Equal Variances(1b average) | | | | | t-Test: Two-Sample Assuming Equal Variances(1b best) | | | | |
|  |  |  |  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  |  | *Variable 1* | *Variable 2* |  |  |
| Mean | -2.35037 | -1.75014 |  |  | Mean | -2.04678 | -1.34177 |  |  |
| Variance | 0.010094 | 0.012725 |  |  | Variance | 0.018098 | 0.006409 |  |  |
| Observations | 30 | 30 |  |  | Observations | 30 | 30 |  |  |
| Pooled Variance | 0.011409 |  |  |  | Pooled Variance | 0.012253 |  |  |  |
| Hypothesized Mean Difference | 0 |  |  |  | Hypothesized Mean Difference | 0 |  |  |  |
| Df | 58 |  |  |  | df | 58 |  |  |  |
| t Stat | -21.7635 |  |  |  | t Stat | -24.6666 |  |  |  |
| P(T<=t) one-tail | 6.88E-30 |  |  |  | P(T<=t) one-tail | 9.7E-33 |  |  |  |
| t Critical one-tail | 1.671553 |  |  |  | t Critical one-tail | 1.671553 |  |  |  |
| P(T<=t) two-tail | 1.38E-29 |  |  |  | P(T<=t) two-tail | 1.94E-32 |  |  |  |
| t Critical two-tail | 2.001717 |  |  |  | t Critical two-tail | 2.001717 |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| F-Test Two-Sample for Variances(1c average) | | | | | F-Test Two-Sample for Variances(1c best) | | | |
|  |  |  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  |  | *Variable 1* | *Variable 2* |  |
| Mean | -2.35037 | -2.73234 |  |  | Mean | -2.04678 | -1.22982 |  |
| Variance | 0.010094 | 0.029689 |  |  | Variance | 0.018098 | 0.013996 |  |
| Observations | 30 | 30 |  |  | Observations | 30 | 30 |  |
| df | 29 | 29 |  |  | df | 29 | 29 |  |
| F | 0.339998 |  |  |  | F | 1.293079 |  |  |
| P(F<=f) one-tail | 0.00244 |  |  |  | P(F<=f) one-tail | 0.246611 |  |  |
| F Critical one-tail | 0.5374 |  |  |  | F Critical one-tail | 1.860811 |  |  |

Abs(mean(Variable 1) mean(Variable2)) Abs(mean(Variable 1) mean(Variable2))

and F F critical and F F critical

Therefore assume equal variances Therefore assume equal variances

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| t-Test: Two-Sample Assuming Equal Variances(1c average) | | | | | t-Test: Two-Sample Assuming Equal Variances(1c best) | | | |
|  |  |  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  |  | *Variable 1* | *Variable 2* |  |
| Mean | -2.35037 | -2.73234 |  |  | Mean | -2.04678 | -1.22982 |  |
| Variance | 0.010094 | 0.029689 |  |  | Variance | 0.018098 | 0.013996 |  |
| Observations | 30 | 30 |  |  | Observations | 30 | 30 |  |
| Pooled Variance | 0.019892 |  |  |  | Pooled Variance | 0.016047 |  |  |
| Hypothesized Mean Difference | 0 |  |  |  | Hypothesized Mean Difference | 0 |  |  |
| Df | 58 |  |  |  | df | 58 |  |  |
| t Stat | 10.48907 |  |  |  | t Stat | -24.9776 |  |  |
| P(T<=t) one-tail | 2.57E-15 |  |  |  | P(T<=t) one-tail | 4.99E-33 |  |  |
| t Critical one-tail | 1.671553 |  |  |  | t Critical one-tail | 1.671553 |  |  |
| P(T<=t) two-tail | 5.13E-15 |  |  |  | P(T<=t) two-tail | 9.97E-33 |  |  |
| t Critical two-tail | 2.001717 |  |  |  | t Critical two-tail | 2.001717 |  |  |

Statistical Analysis for data set 2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| F-Test Two-Sample for Variances(1b average) | | |  | F-Test Two-Sample for Variances(1b best) | | |
|  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  | *Variable 1* | *Variable 2* |
| Mean | -4.25771 | -3.85078 |  | Mean | -4.0374 | -3.56254 |
| Variance | 0.00558 | 0.014931 |  | Variance | 0.009108 | 0.00823 |
| Observations | 30 | 30 |  | Observations | 30 | 30 |
| df | 29 | 29 |  | Df | 29 | 29 |
| F | 0.373695 |  |  | F | 1.106732 |  |
| P(F<=f) one-tail | 0.004973 |  |  | P(F<=f) one-tail | 0.393327 |  |
| F Critical one-tail | 0.5374 |  |  | F Critical one-tail | 1.860811 |  |

Abs(mean(Variable 1) mean(Variable2)) Abs(mean(Variable 1) mean(Variable2))

and F F critical and F F critical

Therefore assume unequal variances Therefore assume unequal variances

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| t-Test: Two-Sample Assuming Unequal Variances(1b average) | | | | t-Test: Two-Sample Assuming Unequal Variances(1b best) | | |
|  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  | *Variable 1* | *Variable 2* |
| Mean | -4.25771 | -3.85078 |  | Mean | -4.0374 | -3.56254 |
| Variance | 0.00558 | 0.014931 |  | Variance | 0.009108 | 0.00823 |
| Observations | 30 | 30 |  | Observations | 30 | 30 |
| Hypothesized Mean Difference | 0 |  |  | Hypothesized Mean Difference | 0 |  |
| df | 48 |  |  | Df | 58 |  |
| t Stat | -15.5628 |  |  | t Stat | -19.7526 |  |
| P(T<=t) one-tail | 1.1E-20 |  |  | P(T<=t) one-tail | 9.86E-28 |  |
| t Critical one-tail | 1.677224 |  |  | t Critical one-tail | 1.671553 |  |
| P(T<=t) two-tail | 2.2E-20 |  |  | P(T<=t) two-tail | 1.97E-27 |  |
| t Critical two-tail | 2.010635 |  |  | t Critical two-tail | 2.001717 |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| F-Test Two-Sample for Variances(1c average) | | |  | F-Test Two-Sample for Variances(1c best) | | |
|  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  | *Variable 1* | *Variable 2* |
| Mean | -4.25771 | -3.97887 |  | Mean | -4.0374 | -3.4499 |
| Variance | 0.00558 | 0.007174 |  | Variance | 0.009108 | 0.015702 |
| Observations | 30 | 30 |  | Observations | 30 | 30 |
| df | 29 | 29 |  | Df | 29 | 29 |
| F | 0.777762 |  |  | F | 0.580072 |  |
| P(F<=f) one-tail | 0.25141 |  |  | P(F<=f) one-tail | 0.074223 |  |
| F Critical one-tail | 0.5374 |  |  | F Critical one-tail | 0.5374 |  |

Abs(mean(Variable 1) mean(Variable2)) Abs(mean(Variable 1) mean(Variable2))

and F F critical and F F critical

Therefore assume equal variances Therefore assume equal variances

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| t-Test: Two-Sample Assuming Equal Variances(1c average) | | | | t-Test: Two-Sample Assuming Equal Variances(1c best) | | |
|  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  | *Variable 1* | *Variable 2* |
| Mean | -4.25771 | -3.97887 |  | Mean | -4.0374 | -3.4499 |
| Variance | 0.00558 | 0.007174 |  | Variance | 0.009108 | 0.015702 |
| Observations | 30 | 30 |  | Observations | 30 | 30 |
| Pooled Variance | 0.006377 |  |  | Pooled Variance | 0.012405 |  |
| Hypothesized Mean Difference | 0 |  |  | Hypothesized Mean Difference | 0 |  |
| Df | 58 |  |  | Df | 58 |  |
| t Stat | -13.5235 |  |  | t Stat | -20.4295 |  |
| P(T<=t) one-tail | 6.95E-20 |  |  | P(T<=t) one-tail | 1.78E-28 |  |
| t Critical one-tail | 1.671553 |  |  | t Critical one-tail | 1.671553 |  |
| P(T<=t) two-tail | 1.39E-19 |  |  | P(T<=t) two-tail | 3.56E-28 |  |
| t Critical two-tail | 2.001717 |  |  | t Critical two-tail | 2.001717 |  |

Statistical Analysis for data set 3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| F-Test Two-Sample for Variances(1b average) | | | | F-Test Two-Sample for Variances(1b best) | | |
|  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* | 3 |  | *Variable 1* | *Variable 2* |
| Mean | -5.18065 | -5.04812 |  | Mean | -5.07056 | -4.85497 |
| Variance | 0.00444 | 0.003088 |  | Variance | 0.001606 | 0.004528 |
| Observations | 6 | 6 |  | Observations | 6 | 6 |
| Df | 5 | 5 |  | df | 5 | 5 |
| F | 1.437776 |  |  | F | 0.354767 |  |
| P(F<=f) one-tail | 0.350014 |  |  | P(F<=f) one-tail | 0.139976 |  |
| F Critical one-tail | 5.050329 |  |  | F Critical one-tail | 0.198007 |  |

Abs(mean(Variable 1) mean(Variable2)) Abs(mean(Variable 1) mean(Variable2))

and F F critical and F F critical

Therefore assume unequal variances Therefore assume equal variances

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| t-Test: Two-Sample Assuming Unequal Variances(1b average) | | | | t-Test: Two-Sample Assuming Equal Variances(1b best) | | |
|  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  | *Variable 1* | *Variable 2* |
| Mean | -5.18065 | -5.04812 |  | Mean | -5.07056 | -4.85497 |
| Variance | 0.00444 | 0.003088 |  | Variance | 0.001606 | 0.004528 |
| Observations | 6 | 6 |  | Observations | 6 | 6 |
| Hypothesized Mean Difference | 0 |  |  | Pooled Variance | 0.003067 |  |
| Df | 10 |  |  | Hypothesized Mean Difference | 0 |  |
| t Stat | -3.74155 |  |  | df | 10 |  |
| P(T<=t) one-tail | 0.001918 |  |  | t Stat | -6.74282 |  |
| t Critical one-tail | 1.812461 |  |  | P(T<=t) one-tail | 2.54E-05 |  |
| P(T<=t) two-tail | 0.003837 |  |  | t Critical one-tail | 1.812461 |  |
| t Critical two-tail | 2.228139 |  |  | P(T<=t) two-tail | 5.09E-05 |  |
|  |  |  |  | t Critical two-tail | 2.228139 |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| F-Test Two-Sample for Variances(1c average) | | | | F-Test Two-Sample for Variances(1c best) | | |
|  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  | *Variable 1* | *Variable 2* |
| Mean | -5.18065 | -5.14319 |  | Mean | -5.07056 | -4.68133 |
| Variance | 0.00444 | 0.002465 |  | Variance | 0.001606 | 0.001974 |
| Observations | 6 | 6 |  | Observations | 6 | 6 |
| df | 5 | 5 |  | df | 5 | 5 |
| F | 1.800988 |  |  | F | 0.81374 |  |
| P(F<=f) one-tail | 0.267066 |  |  | P(F<=f) one-tail | 0.413289 |  |
| F Critical one-tail | 5.050329 |  |  | F Critical one-tail | 0.198007 |  |

Abs(mean(Variable 1) mean(Variable2)) Abs(mean(Variable 1) mean(Variable2))

and F F critical and F F critical

Therefore assume unequal variances Therefore assume equal variances

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| t-Test: Two-Sample Assuming Unequal Variances(1c average) | | | | t-Test: Two-Sample Assuming Equal Variances(1c best) | | |
|  |  |  |  |  |  |  |
|  | *Variable 1* | *Variable 2* |  |  | *Variable 1* | *Variable 2* |
| Mean | -5.18065 | -5.14319 |  | Mean | -5.07056 | -4.68133 |
| Variance | 0.00444 | 0.002465 |  | Variance | 0.001606 | 0.001974 |
| Observations | 6 | 6 |  | Observations | 6 | 6 |
| Hypothesized Mean Difference | 0 |  |  | Pooled Variance | 0.00179 |  |
| df | 9 |  |  | Hypothesized Mean Difference | 0 |  |
| t Stat | -1.10415 |  |  | df | 10 |  |
| P(T<=t) one-tail | 0.149087 |  |  | t Stat | -15.9342 |  |
| t Critical one-tail | 1.833113 |  |  | P(T<=t) one-tail | 9.77E-09 |  |
| P(T<=t) two-tail | 0.298174 |  |  | t Critical one-tail | 1.812461 |  |
| t Critical two-tail | 2.262157 |  |  | P(T<=t) two-tail | 1.95E-08 |  |
|  |  |  |  | t Critical two-tail | 2.228139 |  |