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| --- | --- | --- | --- | --- |
| Data File 1 |  | |  | |
| F-Test Two-Sample for Variances | | |  | |
|  |  | |  | |
|  | *Evolutionary* | | *Random* | |
| Mean | -1.32061403 | | -1.71846003 | |
| Variance | 0.006704596 | | 0.003353969 | |
| Observations | 30 | | 30 | |
| df | 29 | | 29 | |
| F | 1.999003708 | |  | |
| P(F<=f) one-tail | 0.033537742 | |  | |
| F Critical one-tail | 1.860811434 | |  | |
|  |  | |  | |
|  |  | |  | |
|  |  | |  | |
| Data File 1 |  | |  | |
| t-Test: Two-Sample Assuming Unequal Variances | | | | | |
|  | |  | |  | |
|  | | *Evolutionary* | | *Random* | |
| Mean | | -1.32061403 | | -1.71846003 | |
| Variance | | 0.006704596 | | 0.003353969 | |
| Observations | | 30 | | 30 | |
| Hypothesized Mean Difference | | 0 | |  | |
| df | | 52 | |  | |
| t Stat | | 21.72739279 | |  | |
| P(T<=t) one-tail | | 4.72485E-28 | |  | |
| t Critical one-tail | | 1.674689154 | |  | |
| P(T<=t) two-tail | | 9.44971E-28 | |  | |
| t Critical two-tail | | 2.006646761 | |  | |

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| Data File 2 |  |  |
| F-Test Two-Sample for Variances | |  |
|  |  |  |
|  | *Evolutionary* | *Random* |
| Mean | -3.76113468 | -4.27319 |
| Variance | 0.011712731 | 0.002654 |
| Observations | 30 | 30 |
| df | 29 | 29 |
| F | 4.412580613 |  |
| P(F<=f) one-tail | 7.1821E-05 |  |
| F Critical one-tail | 1.860811434 |  |

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| Data File 2 |  |  |
| t-Test: Two-Sample Assuming Unequal Variances | | |
|  |  |  |
|  | *Evolutionary* | *Random* |
| Mean | -3.76113468 | -4.27319 |
| Variance | 0.011712731 | 0.002654 |
| Observations | 30 | 30 |
| Hypothesized Mean Difference | 0 |  |
| df | 42 |  |
| t Stat | 23.39859678 |  |
| P(T<=t) one-tail | 5.1305E-26 |  |
| t Critical one-tail | 1.681952358 |  |
| P(T<=t) two-tail | 1.0261E-25 |  |
| t Critical two-tail | 2.018081679 |  |

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| Data File 3 |  |  |
| F-Test Two-Sample for Variances | | |
|  |  |  |
|  | *Evolutionary* | *Random* |
| Mean | -5.43262148 | -5.71749 |
| Variance | 0.009747031 | 0.000664 |
| Observations | 30 | 30 |
| df | 29 | 29 |
| F | 14.68342686 |  |
| P(F<=f) one-tail | 7.97991E-11 |  |
| F Critical one-tail | 1.860811434 |  |

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| Data File 3 |  |  |
| t-Test: Two-Sample Assuming Unequal Variances | | |
|  |  |  |
|  | *Evolutionary* | *Random* |
| Mean | -5.43262148 | -5.71749 |
| Variance | 0.009747031 | 0.000664 |
| Observations | 30 | 30 |
| Hypothesized Mean Difference | 0 |  |
| df | 33 |  |
| t Stat | 15.29214962 |  |
| P(T<=t) one-tail | 7.71559E-17 |  |
| t Critical one-tail | 1.692360258 |  |
| P(T<=t) two-tail | 1.54312E-16 |  |
| t Critical two-tail | 2.034515287 |  |

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| --- | --- | --- |
| Data File 4 |  |  |
| F-Test Two-Sample for Variances | |  |
|  |  |  |
|  | *Evolutionary* | *Random* |
| Mean | -10.7766828 | -11.002 |
| Variance | 0.005988192 | 0.00066 |
| Observations | 30 | 30 |
| df | 29 | 29 |
| F | 9.078493052 |  |
| P(F<=f) one-tail | 3.00011E-08 |  |
| F Critical one-tail | 1.860811434 |  |

|  |  |  |
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| Data File 4 |  |  |
| t-Test: Two-Sample Assuming Unequal Variances | | |
|  |  |  |
|  | *Evolutionary* | *Random* |
| Mean | -10.7766828 | -11.002 |
| Variance | 0.005988192 | 0.00066 |
| Observations | 30 | 30 |
| Hypothesized Mean Difference | 0 |  |
| df | 35 |  |
| t Stat | 15.1873933 |  |
| P(T<=t) one-tail | 2.82006E-17 |  |
| t Critical one-tail | 1.68957244 |  |
| P(T<=t) two-tail | 5.64012E-17 |  |
| t Critical two-tail | 2.030107915 |  |

The statistical methods were chosen because the distribution is not normal, but the sample size is thirty this allows us to use the f-test to determine the variances. In all cases the mean fitness of the evolutionary algorithm is greater than the mean fitness of random search, and F is greater than F Critical, this allows us to use the two-sample t-Test assuming that the variance are unequal.