cml0081@auburn.edu COMP 5660 Fall 2020 Assignment 1b

**Problem Set A1 Analysis:**

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| F-Test Two-Sample for Variances |  |  |
|  | *1A Best Fitness* | *1B Best Fitness* |
| Mean | 19.93333333 | 18.96666667 |
| Variance | 0.064367816 | 0.37816092 |
| Observations | 30 | 30 |
| df | 29 | 29 |
| F | 0.170212766 |  |
| P(F<=f) one-tail | 3.99847E-06 |  |
| F Critical one-tail | 0.537399965 |  |

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| t-Test: Two-Sample Assuming Unequal Variances | |  |
|  | *1A Best Fitness* | *1B Best Fitness* |
| Mean | 19.93333333 | 18.96666667 |
| Variance | 0.064367816 | 0.37816092 |
| Observations | 30 | 30 |
| Hypothesized Mean Difference | 0 |  |
| df | 39 |  |
| t Stat | 7.959148946 |  |
| P(T<=t) one-tail | 5.36625E-10 |  |
| t Critical one-tail | 1.684875122 |  |
| P(T<=t) two-tail | 1.07325E-09 |  |
| t Critical two-tail | 2.02269092 |  |

Standard Deviation of 1A Best Fitness: 0.253708132

Standard Deviation of 1B Best Fitness: 0.6149479

First, I ran a F-Test in Excel to determine if the variance for 1A and 1B were the same. The variances were not the same, so I ran a Two-Tailed T-Test Assuming Unequal Variances in Excel. Now we can analyze the data from the T-Test. The |t Stat| = 7.959148946 and the |t Critical Two- Tail| = 2.02269092. Since |t Stat| > | t Critical Two- Tail|, I can reject the null hypothesis that the mean difference is zero. This means that algorithm 1A is statistically better for problem set a1, since it has a better mean.

**Problem set A2 Analysis:**

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| --- | --- | --- |
| F-Test Two-Sample for Variances | |  |
|  | *1A Best Fitness* | *1B Best Fitness* |
| Mean | 37.3 | 23.86666667 |
| Variance | 2.010344828 | 89.29195402 |
| Observations | 30 | 30 |
| df | 29 | 29 |
| F | 0.022514289 |  |
| P(F<=f) one-tail | 0 |  |
| F Critical one-tail | 0.537399965 |  |

|  |  |  |
| --- | --- | --- |
| t-Test: Two-Sample Assuming Unequal Variances | |  |
|  | *1A Best Fitness* | *1B Best Fitness* |
| Mean | 37.3 | 23.86666667 |
| Variance | 2.010344828 | 89.29195402 |
| Observations | 30 | 30 |
| Hypothesized Mean Difference | 0 |  |
| df | 30 |  |
| t Stat | 7.700227608 |  |
| P(T<=t) one-tail | 6.84743E-09 |  |
| t Critical one-tail | 1.697260887 |  |
| P(T<=t) two-tail | 1.36949E-08 |  |
| t Critical two-tail | 2.042272456 |  |

Standard Deviation of 1A Best Fitness: 1.417866294

Standard Deviation of 1B Best Fitness: 9.449441995

First, I ran a F-Test in Excel to determine if the variance for 1A and 1B were the same. The variances were not the same, so I ran a Two-Tailed T-Test Assuming Unequal Variances in Excel. Now we can analyze the data from the T-Test. The |t Stat| = 7.700227608 and the |t Critical Two- Tail| = 2. 2.042272456. Since |t Stat| > | t Critical Two- Tail|, I can reject the null hypothesis that the mean difference is zero. This means that algorithm 1A is statistically better for problem set a2, since it has a better mean.

**Problem set A3 Analysis:**

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| F-Test Two-Sample for Variances |  |  |
|  | *1A Best Fitness* | *1B Best Fitness* |
| Mean | 59.6 | 35.93333333 |
| Variance | 13.35172414 | 180.2022989 |
| Observations | 30 | 30 |
| df | 29 | 29 |
| F | 0.074092973 |  |
| P(F<=f) one-tail | 2.32885E-10 |  |
| F Critical one-tail | 0.537399965 |  |

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| t-Test: Two-Sample Assuming Unequal Variances | |  |
|  | *1A Best Fitness* | *1B Best Fitness* |
| Mean | 59.6 | 35.93333333 |
| Variance | 13.35172414 | 180.2022989 |
| Observations | 30 | 30 |
| Hypothesized Mean Difference | 0 |  |
| df | 33 |  |
| t Stat | 9.317440329 |  |
| P(T<=t) one-tail | 4.61087E-11 |  |
| t Critical one-tail | 1.692360309 |  |
| P(T<=t) two-tail | 9.22175E-11 |  |
| t Critical two-tail | 2.034515297 |  |

Standard Deviation of 1A Best Fitness: 3.654001114

Standard Deviation of 1B Best Fitness: 13.42394498

First, I ran a F-Test in Excel to determine if the variance for 1A and 1B were the same. The variances were not the same, so I ran a Two-Tailed T-Test Assuming Unequal Variances in Excel. Now we can analyze the data from the T-Test. The |t Stat| = 9.317440329 and the |t Critical Two- Tail| = 2.034515297. Since |t Stat| > | t Critical Two- Tail|, I can reject the null hypothesis that the mean difference is zero. This means that algorithm 1A is statistically better for problem set a3, since it has a better mean.