**Exercise 8.4 Answer:**

|  |  |  |
| --- | --- | --- |
| t-Test: Paired Two Sample for Means |  |  |
|  |  |  |
|  | *Variable 1* | *Variable 2* |
| Mean | 8.25 | 8.683333333 |
| Variance | 1.059090909 | 1.077878788 |
| Observations | 12 | 12 |
| Pearson Correlation | 0.901055812 |  |
| Hypothesized Mean Difference | 0 |  |
| df | 11 |  |
| t Stat | -3.263938591 |  |
| P(T<=t) one-tail | 0.003772997 |  |
| t Critical one-tail | 1.795884819 |  |
| P(T<=t) two-tail | 0.007545995 |  |
| t Critical two-tail | 2.20098516 |  |
| Difference in Means | -0.433333333 |  |
|  |  |  |

Difference in means:

A difference of -0.43 indicates that, on average, Variable 1 (Agent 1) has a lower impurity than Variable 2 (Agent 2). In this case, Agent 1 should be preferred.

Variance:

This is close between each agent which indicates a consistent range of scores around the mean.

T statistic:

This is a negative value of -3.26 meaning that the mean of agent 1 is lower than agent 2.

Two tailed test:

There is a p value of 0.0075 which means there’s a statistically significant difference in the means.

**Exercise 8.5 Answer:**

There are two values to consider: the p value of the one tailed test being 0.0038 and the critical t value being 1.8. Both values indicate that there is a statistically significant difference in the means (with the critical t value being greater than the absolute value of 3.26). Thus, the conclusion remains the same that Agent 1 has lower impurity levels and should be preferred.

**Exercise 8.6 Answer:**

|  |  |  |
| --- | --- | --- |
| F-Test Two-Sample for Variances |  |  |
|  |  |  |
|  | *Male* | *Female* |
| Mean | 52.91333333 | 44.23333333 |
| Variance | 233.1289718 | 190.1758192 |
| Observations | 60 | 60 |
| df | 59 | 59 |
| F | 1.225860221 |  |
| P(F<=f) one-tail | 0.21824624 |  |
| F Critical one-tail | 1.539956607 |  |
| p2 | 0.43649248 |  |

The F value is 1.226 and has 59 degrees of freedom.

The P value is 0.44 and is not statistically significant.

The F ratio is not significant.

This would mean that the income difference between males and females do not differ. An equal variance of the unrelated sample t test is then conducted.

|  |  |  |
| --- | --- | --- |
| t-Test: Two-Sample Assuming Equal Variances |  |  |
|  |  |  |
|  | *Male* | *Female* |
| Mean | 52.91333 | 44.23333333 |
| Variance | 233.129 | 190.1758192 |
| Observations | 60 | 60 |
| Pooled Variance | 211.6524 |  |
| Hypothesized Mean Difference | 0 |  |
| df | 118 |  |
| t Stat | 3.2679 |  |
| P(T<=t) one-tail | 0.00071 |  |
| t Critical one-tail | 1.65787 |  |
| P(T<=t) two-tail | 0.001419 |  |
| t Critical two-tail | 1.980272 |  |
| Difference in Means | 8.68 |  |

The t stat is 3.27 with 118 degrees of freedom.

The two-tailed p value is 0.0014, thus t is significant and there is a significant difference in means.

The difference in means of 8.68 indicates that on average males have a higher income than females.