F-Test and t-Test Analysis

A. F-Test: Two-Sample for Variances

The F-test helps determine whether the variances of the two groups (male and female incomes) are significantly different.

Key Results:

1. **F-statistic: 1.22586**

   This value represents the ratio of the variance for males (233.129) to the variance for females (190.176).

2. **p-value (one-tail): 0.2182**

   This indicates the probability of observing an F-statistic at least as extreme as 1.22586 if the null hypothesis of equal variances is true.

3. **F Critical (one-tail): 1.53996**

   The critical value at a 5% significance level, given 59 degrees of freedom in each group.

Interpretation:

Since $F < F_{critical}$ (1.2259 < 1.5400) and $p > 0.05$ (0.2182 > 0.05), we do not reject the null hypothesis. Therefore, there is no statistically significant evidence that the variances of male and female incomes differ. This result justifies assuming equal variances for the subsequent t-test.

B. t-Test: Two-Sample Assuming Equal Variances

Given the F-test results, the t-test examines whether the mean male income is significantly higher than the mean female income under the assumption of equal variances.

Key Results:

1. **Means:**

   — Males: *52.913*

   — Females: *44.233*

   — Difference in means: *52.913 − 44.233 ≈ 8.68*

2. **t-Statistic: 3.2679**

   — Reflects the standardized difference between the two means, using the pooled variance.

3. **Degrees of Freedom (df): 118**

   — Derived from the sample sizes and variances in both groups.

4. **p-value (one-tail): 0.00071**

   — The probability of observing a t-statistic at least as large as 3.2679 under the null hypothesis.

5. **t Critical (one-tail): 1.6579**

   — The threshold at α = 0.05 for a one-tailed test.

Interpretation:

Since $t > t_{critical}$ (3.2679 > 1.6579) and $p < 0.05$ (0.00071 < 0.05), we reject the null hypothesis. This indicates strong evidence that the mean male income is higher than the mean female income. The difference in means (approximately £8,680) suggests that males earn, on average, around £8,680 more per year than females.