P452 - Assignment – 3

Question-3

The Grades have been divided into equal bins of width 1 with grade C at the center. The calculations of the same are shown in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **x-point** | **Grades** | **Unbiased Distribution f(x)** | **Expected Frequency N\*f(x)** | **Observed Frequency** |  |
| 2 | **A** | 0.0540 | 32.3946 | 77.0000 | 61.4190 |
| 1 | **B** | 0.2420 | 145.1824 | 150.0000 | 0.1599 |
| 0 | **C** | 0.3989 | 239.3654 | 210.0000 | 3.6025 |
| 1 | **D** | 0.2420 | 145.1824 | 125.0000 | 2.8056 |
| 2 | **E** | 0.0540 | 32.3946 | 38.0000 | 0.9699 |
| **chi Square** | | | | | 68.957017 |

We performed a chi-square (χ^2) test and got a χ^2 value of 68.95 with 4 degrees of freedom. The critical χ^2 values from the table are 9.49 at a 5% significance level and 7.78 at a 10% significance level.

Since our χ^2 value of 68.95 is much larger than both critical values, we reject the hypothesis. This suggests that the results are not due to chance, and are therefore biased

Question-4

Students t-Test

The students t-Test has been done and the results has been tabulated in the table.

|  |  |  |
| --- | --- | --- |
| **Mean** | 4.714615 | 4.740000 |
| **Standard Deviation** | 0.101293 | 0.075277 |
| **Variance** | 0.010260 | 0.005667 |
| **n** | 13.000000 | 7.000000 |
| **t-Value** | **0.634858601** | |
| **t-test prob** | **0.569400** | |
| **F-Value** | 1.810633484 | |
| **Q-Value** | 0.480426 | |

We performed a statistical test on two data sets. The results showed a probability of 0.5694 and a t-value of 0.6348. We used a degree of freedom (dof) of 18 (calculated as 13+7-2).

We compared our t-value with the critical t-value (t\_crit) of 2.101 for dof=18 from a t-table (provided in an attached Excel file). Since our t-value is less than the t\_crit, we accept the Null hypothesis. This means we found no significant difference between the two data sets, suggesting they come from the same population.

**F Test:**

We performed an F-Test on our data. The F-Value we got is 1.81. We then looked up the Q-Value for this F-Value with degrees of freedom 12 and 6 (calculated as 13-1 and 7-1), which is Q(1.81,12,6) = 2.9. This Q-Value corresponds to a significance level (α) of 0.1.

The rejection region at this significance level is [2.9,∞]. Since our F-Value of 1.81 is not in this rejection region, we do not reject the Null hypothesis. This means we conclude that the two variances are equal (σ\_A=σ\_B) with 90% confidence.