

## 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
<b>chi Square</b>					68.957017

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

Since our  $\chi^2$  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.

<b>Mean</b>	4.714615	4.740000
<b>Standard Deviation</b>	0.101293	0.075277
<b>Variance</b>	0.010260	0.005667
<b>n</b>	13.000000	7.000000
<b>t-Value</b>	<b>0.634858601</b>	
<b>t-test prob</b>	<b>0.569400</b>	
<b>F-Value</b>	1.810633484	
<b>Q-Value</b>	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 ( $\alpha$ ) of 0.1.

The rejection region at this significance level is  $[2.9, \infty]$ . 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 ( $\sigma_A = \sigma_B$ ) with 90% confidence.