Assignment 3

Jabed Umar

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1 Question 3

From the given dataset, we can get that

X point	Grades	f(x)	E	O	$(O-E)^2$	$(O-E)^2/E$
2	A	0.24	141.402	77	4147.62	29.33
1	B	0.7	419.082	150	72405.12	172.77
0	C	0.94	561.444	210	123512.89	219.99
1	D	0.53	319.128	125	37685.68	118.09
2	F	0.08	50.274	38	150.65	3

The χ^2 value was obtained to be 543.18 for 4 degrees of freedom. So, from the table given in the lecture slide, the critical value of the χ^2 is 9.488 at 5 % Level of significance and 7.779 at 10% Level of significance. So, the observed χ^2 is much greater than both of the critical value. So, we have enough evidence to reject the hypothesis and say that the results are biased.

2 Question 4

The given data set are:
f1 = [4.65, 4.84 ,4.59 ,4.75 ,4.63 ,4.75 ,4.58 ,4.82 ,4.86, 4.60, 4.77, 4.65, 4.80]
f2 = [4.75, 4.79, 4.74, 4.74, 4.77, 4.58, 4.81]
The mean (μ) of the two data set are 4.715 and 4.74.
The standard deviation (s) of the two data set are 0.097 and 0.0697.
The t value of the given data set is

$$t = \frac{|\mu_1 - \mu_2|}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = 0.673 \tag{1}$$

where n_1 and n_2 are the no of data points in f1 and f2.
For 18 degrees of freedom and $\alpha = 0.1$, the critical t-value is 2.88 (obtained from an online table). However, our calculated t-value is 0.673. Therefore, we fail to reject the null hypothesis, suggesting that the two datasets likely belong

to the same population or do not exhibit a statistically significant difference. Similarly,

$$f = \frac{s_1^2}{s_2^2} = 1.95 \tag{2}$$

For 18 degrees of freedom and $\alpha = 0.1$, the rejection region of the given hypothesis is $[2.9047, \infty]$ (obtained from an online table). However, our calculated f-value is 1.95. Therefore, we fail to reject the null hypothesis, suggesting that the two datasets likely belong to the same population or do not exhibit a statistically significant difference.