

Assignment 3

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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	0.023	13.8	77	3994.24	289.44
1	B	0.136	81.6	150	4678.56	57.34
0	C	0.682	409.2	210	39680.64	96.97
1	D	0.136	81.6	125	1883.56	23.08
2	F	0.023	13.8	38	585.64	42.44

The χ^2 value was obtained to be 509.645 for 4 degrees of freedom. So, from the table in the lecture slide, the critical value of the χ^2 is 9.488 at 5 % Level of significance and 7.779 at 10%. So, the observed χ^2 is much greater than both of the critical values. So, we have enough evidence to reject the hypothesis and say that the results are biased.

2 Question 4

The given data set is:

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 two data sets' mean (μ) are 4.715 and 4.74.

The two data sets' standard deviation (s) are 0.097 and 0.0697.

The t value of the given data set is

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

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.