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Data Science, 2022

Tut 5: Evaluation and Measurement- Hypothesis Testing

Make Assumptions about values when it is necessary in consistent manner. Refer necessary table from following link when necessary.

https://www.sheffield.ac.uk/polopoly_fs/1.43999!/file/tutorial-10-reading-tables.pdf

Testing a Proportion of small samples

- 1. H_0 : $p = p_0$
- 2. One of the alternatives H\: $p < p_n$, $p > p_o$, or $p \neq p_o$
- 3. Choose a level of significance equal to a.
- 4. Test statistic: Binomial variable X with $p = p_0$.
- 5. Computations: Find x, the number of successes, and compute the appropriate P-value.
- 6. Decision: Draw appropriate conclusions based on the P-value

Ex. 1

A builder claims that air-conditions are installed in 70% of all homes being constructed today in the city of Mumbai. Would you agree with this claim if a random survey of new homes in this city shows that 8 out of 15 had air-conditions installed? Use a 0.10 level of significance

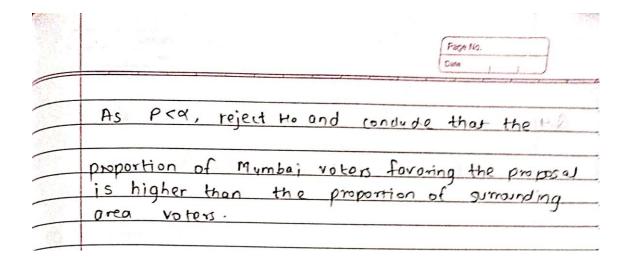
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A commonly prescribed drug for relieving nervous tension is believed to be only 60% effective. Experimental results with a new drug administered to a random sample of 100 adults who were suffering from nervous tension show that 70 received relief. Is this sufficient evidence to conclude that the new drug is superior to the one commonly prescribed? Use a 0.05 level of significance.

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A vote is to be taken among the residents of a Mumbai and the surrounding area to determine whether a proposed Nuclear plant should be constructed. The construction site is within the Mumbai limits, and for this reason many voters in the surrounding area feel that the proposal will pass because of the large proportion of Mumbai voters who favor the construction. To determine if there is a significant difference in the proportion of Mumbai voters and surrounding area voters favoring the proposal, a poll is taken. If 120 of 200 Mumbai voters favor the proposal and 240 of 500 surrounding area residents favor it, would you agree that the proportion of Mumbai voters favoring the proposal is higher than the proportion of surrounding area voters? Use an a = 0.05 level of significance.

	Page No.
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Pr be the proportion of s	urrounding area re.
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<u>Ex.4</u>

State the null and alternative hypotheses to be used in testing the following claims, and determine generally where the critical region is located:

- (a) At most, 20% of next year's wheat, crop will be exported to the Russia.
- (b) On the average, Indian homemakers drink 3 cups of tea per day.
- (c) The proportion of graduates in engineering this year majoring in the computer sciences is at least. 0.15.
- (d) The average donation to the Indian Autism Association is no more than 500 INR.
- (e) Residents in suburban Mumbai commute, on the average, 15 kilometers to their place of employment.

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<u>Ex.5</u>

In a study conducted by the Department of computer Engineering and analyzed by the Statistics Consulting Center at SPIT the laptops supplied by two different companies were compared. Ten sample laptops were made out of the Intel chips supplied by each company and the "robustness" was studied. The data are as follows:

Company A: 9.3 8.8 6.8, 8.7 8.5 6.7 8.0 6.5 9.2 7.0

Company B: 11.0 9.8 9.9 10.2,10.1 9.7 11.0 11.1 10.2 9.6

Can you conclude that there is virtually no difference in means between the laptops supplied by the two companies? Use a P-value to reach your conclusion. Should variances be pooled here?

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Page No. The test statistics used to test these hypothesis; 81-82 - (U1-42) S2 + S22 - 288-01 which under the null hypothesis, follows approximates t-distribution with v=10 degrees of freedom. Also, under the null hypothesis we have 4,-4,20, so the value of test statistic is 7.95-10.26 = -5.90 1.207 + 0.325 Since sample varioneds are office philipperent 1218 Course Distance that regulations springer Since the test is two sided, then the value of test is the doubled area under the density curve of to-distribution with 100 degrees of freedom, right of the absolute value of test statistic ItI= 1-5.90 = 5.90 ind the p-value is p-value - Q. P (TZ 1 H) = 2. P (T 2 5.90) + 1,000s (10) = 4.587 and since | H=590 is even greater than P(T 75.90) (0.0005 , So p-value 7 0.001 Perglue ~600

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