Business Statistics Mr. Nelson

CHI SQUARE TEST OF SIGNIFICANCE - GOODNESS OF FIT CLICK HERE *for what to do before starting four step procedure.*

EXAMPLE DATA & INFORMATION:

$\tilde{p}_1 = 36.7\%$ $\tilde{p}_2 = 38.3\%$ $\tilde{p}_3 = 25.0\%$ $\alpha = 5\%$ $n = 300$

Population Granada Hills Charter High School students

Focus Proportion Preferences for breakfast (1. Blueberry Muffins, 2. Raisin Oatmeal, 3.Pancakes)

Note: RED SCRIPT IS INSTRUCTIONAL AND WOULD NOT BE INCLUDED IN YOUR TWO-PAGE, FOUR-STEP PRESENTATION

FORMAL WRITTEN PRESENTATION FOLLOWS

Step I Identify Procedure:

CLICK HERE *for Background on Step One Identify Procedure*

We want to test the evidence against the claim that the proportions of student preferences for breakfast in the population of Granada Hills Charter High School students is the same for all subcategories (1. blueberry muffins, 2. raisin oatmeal, 3. pancakes).

The null and alternative hypotheses are:

$H_0: \rho_1 = \rho_2 = \rho_3 = 33.3\%$

H_A: One set of proportions are not equal.

Either $\rho_1 \neq \rho_2$ and/or $\rho_1 \neq \rho_3$ and/or $\rho_3 \neq \rho_2$

(Note: H_A says at least one of the sets of proportions is not equal, but it does not state how many are not equal or which set(s) of proportions are not equal.)

Step II Check Conditions:

Just list conditions below. CLICK HERE *for More Information on Inference Conditions.*

* Random Sample: A random sample was conducted to insure every member of the population was equally likely to be selected.

* Independence: (1) The lack of replacement is not a problem in this case because the number of subjects in the population is more than ten times the sample size. (2) No expected counts were less than one, and 80% or more of the expected counts were 5 or more.

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Step III Perform Procedure:

CLICK HERE *for More Information on Perform Procedure.*

df (degrees of freedom) = (3-1) = 2

Expected Counts If $\rho_1 = \rho_2 = \rho_3 = 33.3\%$:

Blueberry Muffins	100	(300 X 33.3%)
Raisin Oatmeal	100	(300 X 33.3%)
Pancakes	100	(300 X 33.3%)
Total	300	

Observed Counts:

Blueberry Muffins	110
Raisin Oatmeal	115
Pancakes	75
Total	300

$$\chi^2 = \sum \frac{(Observed\ Count - Expected\ Count)^2}{Expected\ Value} =$$

$$\frac{(110-100)^2}{100} + \frac{(115-100)^2}{100} + \frac{(75-100)^2}{100} = \frac{(10)^2}{100} + \frac{(15)^2}{100} + \frac{(-25)^2}{100} = \frac{100}{100} + \frac{225}{100} + \frac{625}{100} = 1.0 + 2.25 + 6.25 = 9.5$$

$$P - Value = P(\chi^2 > 9.5 | \rho_1 = \rho_2 = \rho_3) = 0.9\%$$

Step IV Interpretation:

Determine whether to "Reject Null Hypothesis" or "Fail To Reject Null Hypothesis"
Use the appropriate paragraph from the Inference Form, Step Four.

We reject the null hypothesis at the 5% significance level (α). The P-value of 0.9% falls well below the significance level, thus there is strong evidence that the alternative hypothesis is true, the proportions of preferences for breakfast in the population of Granada Hills Charter High School students (ρ_1, ρ_2, ρ_3) are not all equal. The proportion of students who preferred pancakes contributed the largest component of the Chi Square statistic. This relatively large contribution suggests it is the proportion that it is not equal to the other proportions.

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Notice we rejected the null hypothesis because the P-value (the probability of getting a set of sample proportions with this amount of difference when the actual population proportions were actually equal) was only 0.9%, lower than the significance level of 5%. This combination of events is too rare to continue with the assumption that population proportions are all equal, thus we reject the original hypothesis, and conclude that the actual proportion must be lower.

CLICK HERE ***to review the final draft of this two-page, four-step inference procedure***

CLICK HERE ***for Statistics Greek Letters (μ , ρ, α) go to Insert Symbols: Under Greek & Coptic***