NOVA – Chi Square I & II

1. What is the primary use of the Chi-Square test?

A) To compare means of two continuous variables
B) To test differences in proportions for categorical data
C) To measure correlation between discrete variables
D) To calculate regression coefficients

Answer: B) To test differences in proportions for categorical data

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2. In a Chi-Square test, the null hypothesis (H_o) for a 2×2 contingency table typically states:

A) The two variables are correlated
B) The two variables are independent
C) The proportions are unequal
D) The sample sizes are identical

Answer: B) The two variables are independent (no association)

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3. How are expected frequencies (E) calculated for a cell in a contingency table?

A)
E = (Row Total × Column Total) / Grand Total
B)
E = Observed Frequency × Grand Total
C)
E = (Row Total + Column Total) / 2
D)
E = Grand Total − Observed Frequency

Answer: A) E = (Row Total × Column Total) / Grand Total

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4. For a Chi-Square test with 3 rows and 4 columns, the degrees of freedom (df) would be:

A) 7
B) 6
C) 12
D) 5

Answer: B) 6
(df = (rows - 1) × (columns - 1) = 2 × 3 = 6)

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5. Yates' continuity correction is applied to:

A) Increase the Chi-Square value for small sample sizes
B) Reduce bias in 2×2 tables with small expected frequencies
C) Convert continuous data to categorical data
D) Adjust for unequal variances

Answer: B) Reduce bias in 2×2 tables with small expected frequencies

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6. If the calculated Chi-Square value is 0.061 and the critical value (α = 0.05, df = 1) is 3.84, what should you conclude?

A) Reject H_o; there is a significant difference
B) Fail to reject H_o; no significant difference
C) Increase the sample size and retest
D) Accept H_a; the variables are dependent

Answer: B) Fail to reject H_o; no significant difference
(0.061 < 3.84)

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7. Which of the following is a limitation of the Chi-Square test?

A) It cannot handle small expected frequencies (<5)
B) It requires normally distributed continuous data
C) It is only applicable for paired samples
D) It assumes linear relationships

Answer: A) It cannot handle small expected frequencies (<5)

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8. The Chi-Square formula:

$$X^2 = \Sigma (O - E)^2 / E$$

measures:

A) The variance between groups
B) The discrepancy between observed and expected frequencies
C) The standard error of proportions
D) The effect size of the association

Answer: B) The discrepancy between observed and expected frequencies

9. A beverage company wants to know if gender influences preference for their new energy drink. The marketing team surveys 100 people (40 males and 60 females) and records whether they like or dislike the drink.

The observed responses are shown below:

Gender	Like	Dislike	Total
Male	30	10	40
Female	20	40	60
Total	50	50	100

The team wants to know: Is product preference dependent on gender?

Calculated = 16.66, so yes, it's dependent!!

10. You run a Chi-Square test on a 2×2 table and get $\chi 2=0\chi 2=0$. What must be true?

A) All observed = expected
B) The variables are perfectly correlated
C) The sample size is infinite
D) You used Yates' correction

Answer: A) All observed = exprcted

11. For a 2×2 table with:

- **O=[10,20,30,40], χ^2=4.0.**
  After Yates' correction, the χ^2 becomes 3.2. What happens to the p-value?

A) Increases (less significant)
B) Decreases (more significant)
C) Stays the same
D) Depends on degrees of freedom

Answer: A) Increases