Stat 2470, 4/28 Discussion Questions   Name _____

Instructions: Attempt to answer these questions by reading the textbook or with online resources before coming to class on the date above.

1. What kind of situation are χ^2 tests designed to analyze?

independence and model fit
(homogeniety)

2. What is the formula for χ^2?

$$\chi^2 = \sum_{all\ cells} \frac{(observed - expected)^2}{expected}$$

3. How do we find the expected numbers in each category? Or the probabilities?

probabilities (or a model) may be given the multiply
by the total sample size ($\sum$ observed).

4. How do we find the degrees of freedom of the χ^2 test?

\# Cells - one

5. How do we get the P-value for the test out of the calculator?

χ^2 cdf (test statistic, E99, df)

6. What is the null and alternative hypotheses for the χ^2 test?

Ho: fits the model
Ha: does not fit the model

7. How can we get the expected numbers for our χ^2 test when we want the data to fit a particular distribution?

Calculate the probabilities for the distribution then multiply by total sample size.

Typically for discrete (or discretized) distributions

8. How does the calculation change for continuous distributions?

break into classes, the calc prob. for each class

9. How do two-way contingency tables work with χ^2 tests?

Similar to one row, but the expected count in each cell is given by $e_{ij} = \dfrac{(\text{sum of } i\text{th row})(\text{sum of } j\text{th column})}{\text{total sum of all squares}}$

then $\chi^2 = \sum_{\text{all cells}} \dfrac{(exp - obs)^2}{\text{expected}}$

10. How do we calculate expected numbers for each cell?

11. How is the test for homogeneity and the test for independence essentially the same?

the calculations are identical
if the variables are independent, then the probabilities should be the same everywhere (wrt the second variable)

12. What degrees of freedom are needed for testing contingency tables?

table is $m \times n$ matrix then $df = (m-1)(n-1)$

13. How can it be done in the calculator?

Stat → Tests → χ^2 test

enter observations in matrix A. calculator does the rest