Chi –Square Distribution to test

the independence of two variables

Step 1: Set up the hypotheses:

Hº: The variables are independent

H¹: The variables are not

independent.

Step 2: Compute the expected frequency for each cell in the contingency table by use of the formula:

E=Expected frequency= (Row total)(Column Total)

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Sample size

Step 3: Compute the statistic χ ²=Σ(O-E)² / E

Where O is the observed frequency, E is the expected

frequency, and the sum Σ is over all cells.

Step 4: Find the critical value χ²α in Table A. 10 page 651. Use the level of significance of 0.01 and the number of degrees of d.f. to find the critical value.

d.f.= (R-1)(C-1)

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where R is the number of rows and C is the number of columns of cells in the contingency table. The critical region consists of all values of χ²α.

Step5: Compare the sample statistic χ² of Step 3 with the critical value of χ²α of Step 4. If the sample statistic is larger, reject the null hypothesis of independence. Otherwise, do not reject the null hypothesis.

Problem

The following table shows the Myers-Briggs personality preference and professions for a random sample of 2408 people in the listed professions.

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Personality Preference Type

Occupation Extrovert Introvert Row Total

\_Clergy\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_308\_\_\_\_\_\_\_\_\_\_\_\_\_226\_\_\_\_\_\_\_\_534\_\_

\_M.D.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_667\_\_\_\_\_\_\_\_936\_\_\_\_\_\_ \_1603\_ Lawyer\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_112\_\_\_\_\_\_\_\_159\_\_\_\_\_\_\_\_271\_\_\_\_Column total\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1087\_\_\_\_\_- 1321 2408 \_

Use the chi-square test to determine if the listed occupations and personality preferences are independent at the 0.01 level of significance.