Inside Class

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block:\_\_\_\_\_\_\_\_\_\_

**Chi-Squared Lesson 2: Chi-Squared and the Formal Test for Independence**

The table shows the responses to a survey as to whether the city speed limit should be increased.

Test at a 5% level whether there is any association between the *age of a driver* and *increasing the speed limit*.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *18-30 yrs.* | *31-54 yrs.* | *55+ yrs.* | Sum |
| *Increase* | 234 | 169 | 134 |  |
| *No Increase* | 156 | 191 | 233 |  |
| Sum |  |  |  |  |

**Expected Data**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *18-30 yrs.* | *31-54 yrs.* | *55+ yrs.* | Sum |
| *Increase* |  |  |  |  |
| *No Increase* |  |  |  |  |
| Sum |  |  |  |  |

Step 1: *H0* (**null hypothesis**): There is no relationship between \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

*H1* (**alternative hypothesis**): There is a relationship between \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Step 2: Calculate the **degrees of freedom**: df = (*r* – 1)(*c* – 1). df = ( \_\_\_ – 1)( \_\_\_ – 1) = \_\_\_\_\_.

Step 3: The **significance level** being used is \_\_\_\_\_\_\_\_\_\_.

Step 4: The null-hypothesis will be rejected if  the critical value of \_\_\_\_\_\_\_\_\_\_\_.

Step 5: 

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Total () = |  |

Step 6: I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the null hypothesis because the calculated chi-squared value of

\_\_\_\_\_\_\_\_\_\_\_ is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the critical value of \_\_\_\_\_\_\_\_\_\_\_\_.

Therefore, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Formal Test for Independence**

Step 1: We state *H0* called the **null hypothesis**. This is a statement that the two classifications being considered are independent.

We state *H1* called the **alternative hypothesis**. This is a statement that the two classifications being considered are not independent.

Step 2: Calculate the **degrees of freedom**:

df= (*r* – 1)(*c* – 1).

Step 3: We quote the **significance level** required, i.e., 10%, 5%, 1%

Step 4: We state the **rejection inequality** where *k* is obtained from the **table of critical values**.

Step 5: From the contingency table, find  using 

Step 6: We either accept *H0*or reject *H0* depending on the rejection inequality result.

**Table of critical values**

