**Exr 9 – Chi-square independent and homogeneity tests**

1. Write a matlab code that performs an independent or homogeneity test
   1. [h,p, chi2, df] = my\_chi2Test(tableData). Remember to verify the conditions.
2. In a study of the television viewing habits of children, a developmental psychologist selects a random sample of 300 first graders - 100 boys and 200 girls. Each child is asked which of the following TV programs they like best: The Lone Ranger, Sesame Street, or The Simpsons. Results are shown in the [contingency table](https://stattrek.com/Help/Glossary.aspx?Target=Contingency%20table) below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Viewing Preferences** | | | **Total** |
| **Lone Ranger** | **Sesame Street** | **The Simpsons** |
| **Boys** | 50 | 30 | 20 | 100 |
| **Girls** | 50 | 80 | 70 | 200 |
| **Total** | 100 | 110 | 90 | 300 |

1. Do the boys' preferences for these TV programs differ significantly from the girls' preferences?
2. Is this a homogeneity test or independent test?
3. Assume we sample our city citizens randomly, and than classify each person by its profession and neighborhood (A,B, C and D). We got the below table.
   1. Are neighborhoods are associated with profession?
   2. Translate the table into rates
   3. What is the effect size?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | *B* | *C* | *D* | total |
| *A* |
| White collar | 90 | 60 | 104 | 95 | 349 |
| Blue collar | 30 | 50 | 51 | 20 | 151 |
| No collar | 30 | 40 | 45 | 35 | 150 |
| Total | 150 | 150 | 200 | 150 | 650 |

1. Using the data below (note that it is not exactly the same as in exe. 9.1) . Assume the samples come from a normal distribution.
   1. Test if the variances are the same using the F test manually by computing the F value = var(controlA)/var(treatmentA) and then using the *fcdf* (F cumulative distribution function) function.

Note that for two sided test we multiple the one side p value by 2.

* 1. Repeat when you use the F value = var(treatmentA)/ var(controlA)
  2. Compare the results to those from the built-in matlab/pyton function.
  3. Test the hypothesis using permutation test

controlA=[0.22, -0.87, -2.39, -1.79, 0.37, -1.54, 1.28, -0.31, -0.74, 1.72, 0.38, -0.17, -0.62, -1.10, 0.30, 0.15, 2.30, 0.19, -0.50, -0.09]

treatmentA=[-5.13, -2.19, -2.43, -3.83, 0.50, -3.25, 4.32, 1.63, 5.18, -0.43, 7.11, 4.87, -3.10, -5.81, 3.76, 6.31, 2.58, 0.07, 5.76, 3.50 1]