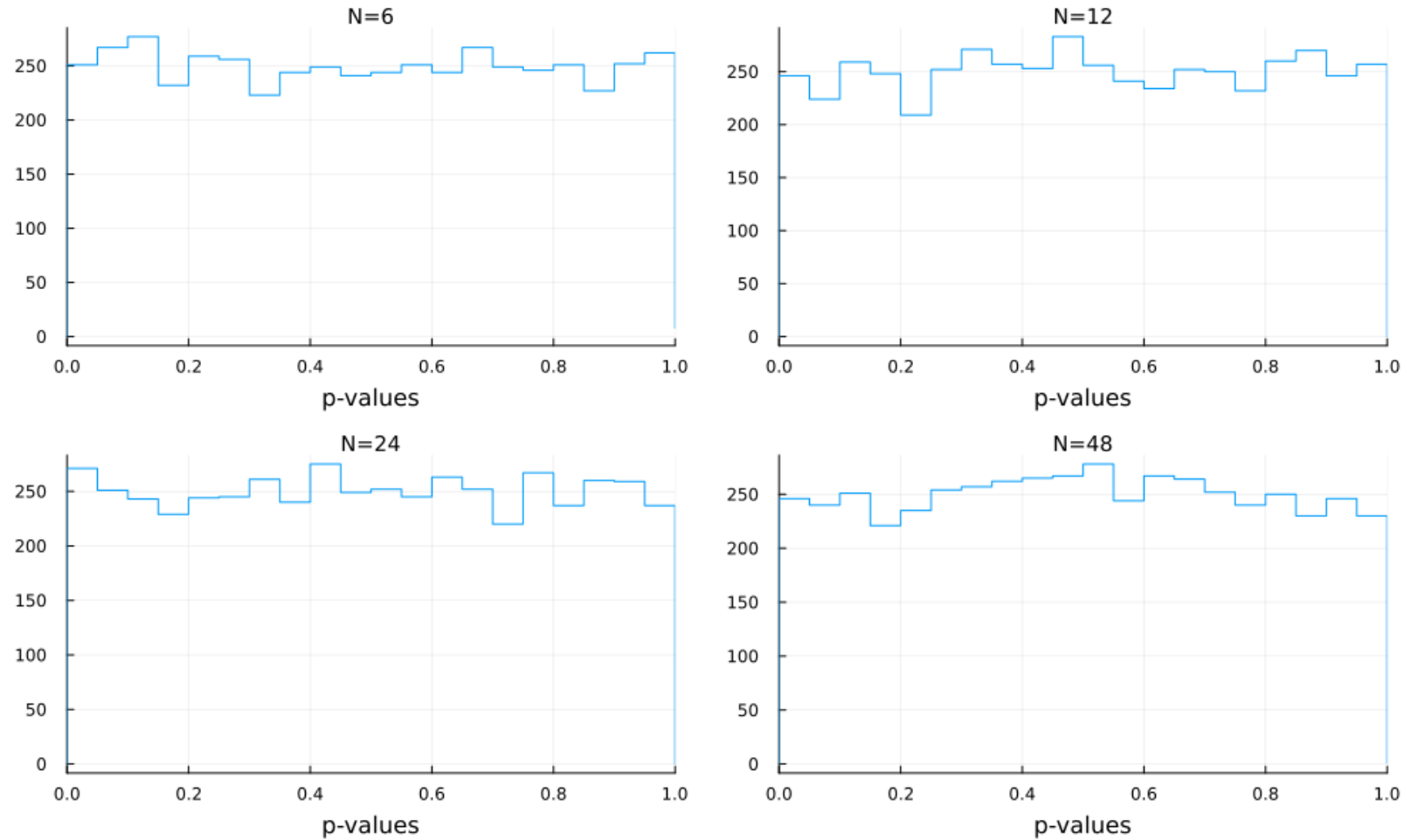# Control of the Type I error and FWE
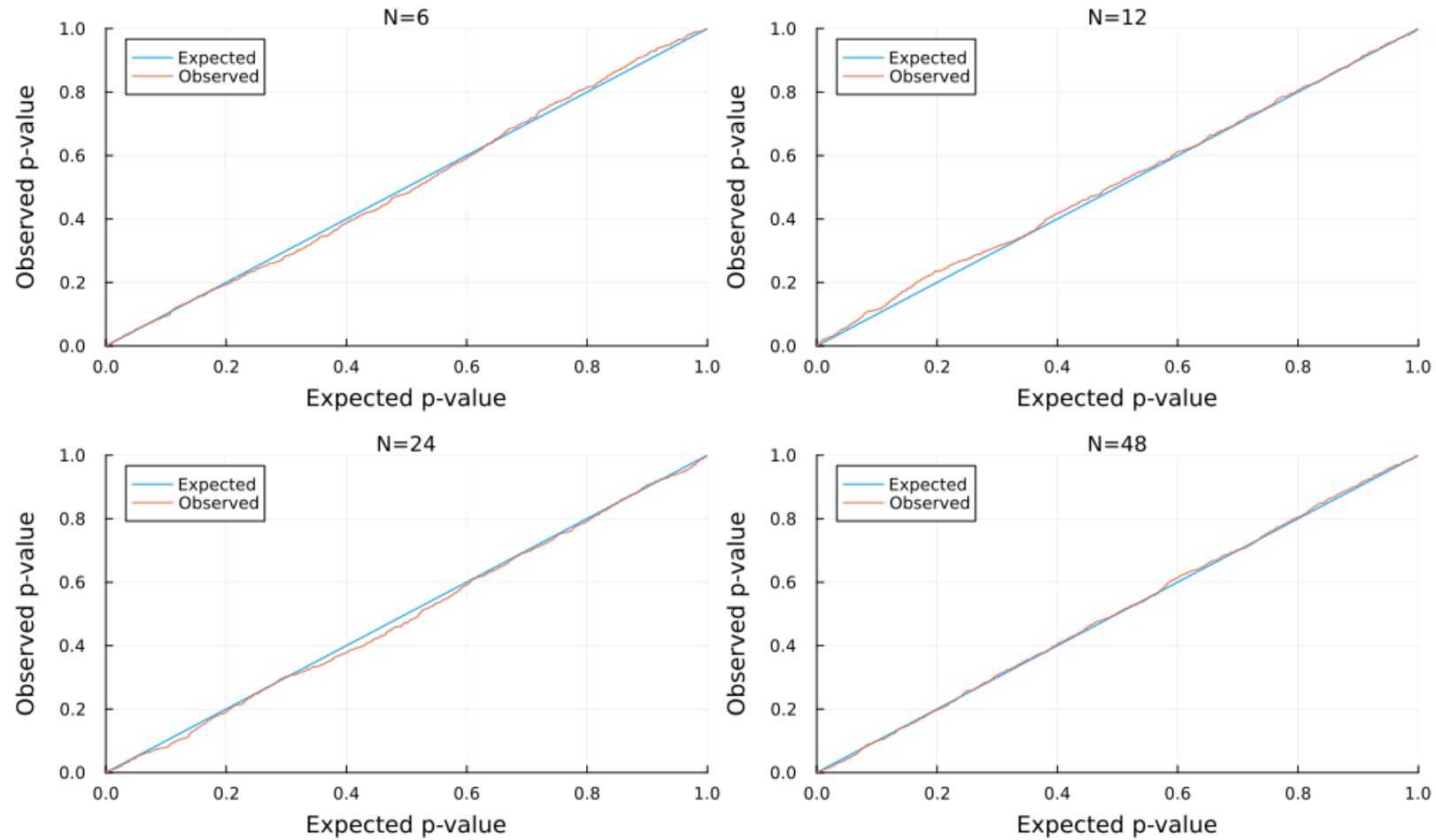
PermutationTests.jl

Univariate Tests

Random Gaussian data is generated under H0 for many simulations and the observed p-value is recorded
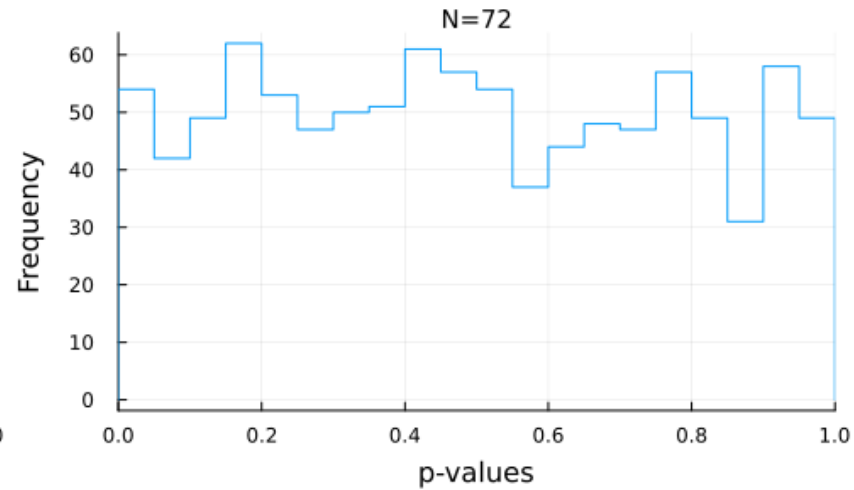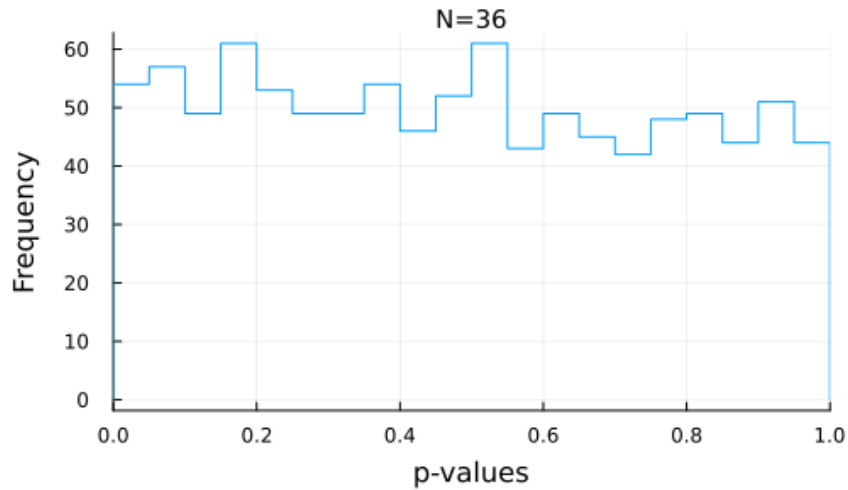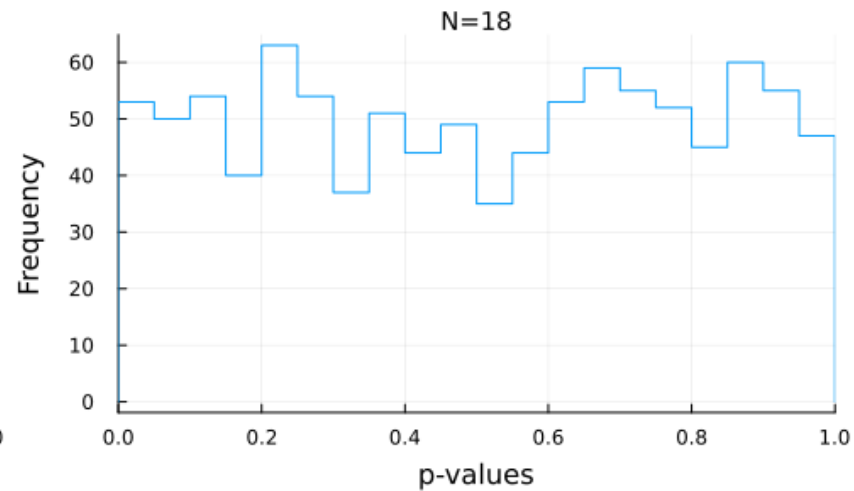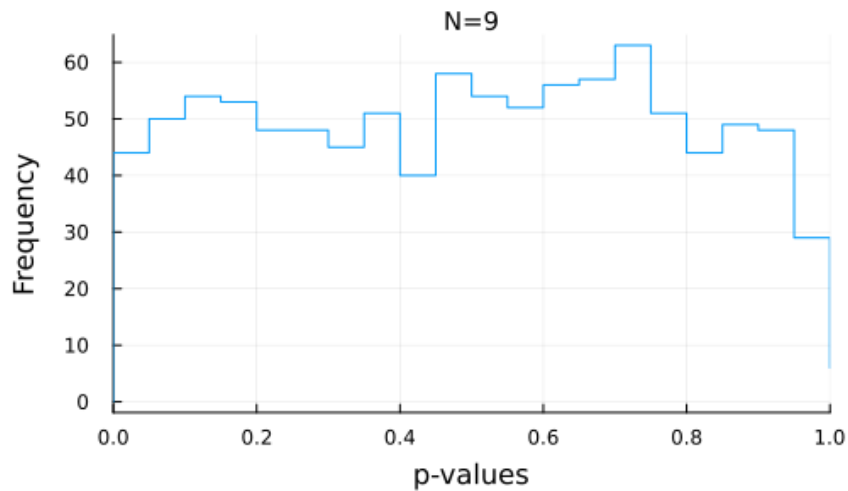
Univariate correlation test. 5000 simulations

The histogram of p-values is uniform, as expected under H0, regardless the number of observations (N)
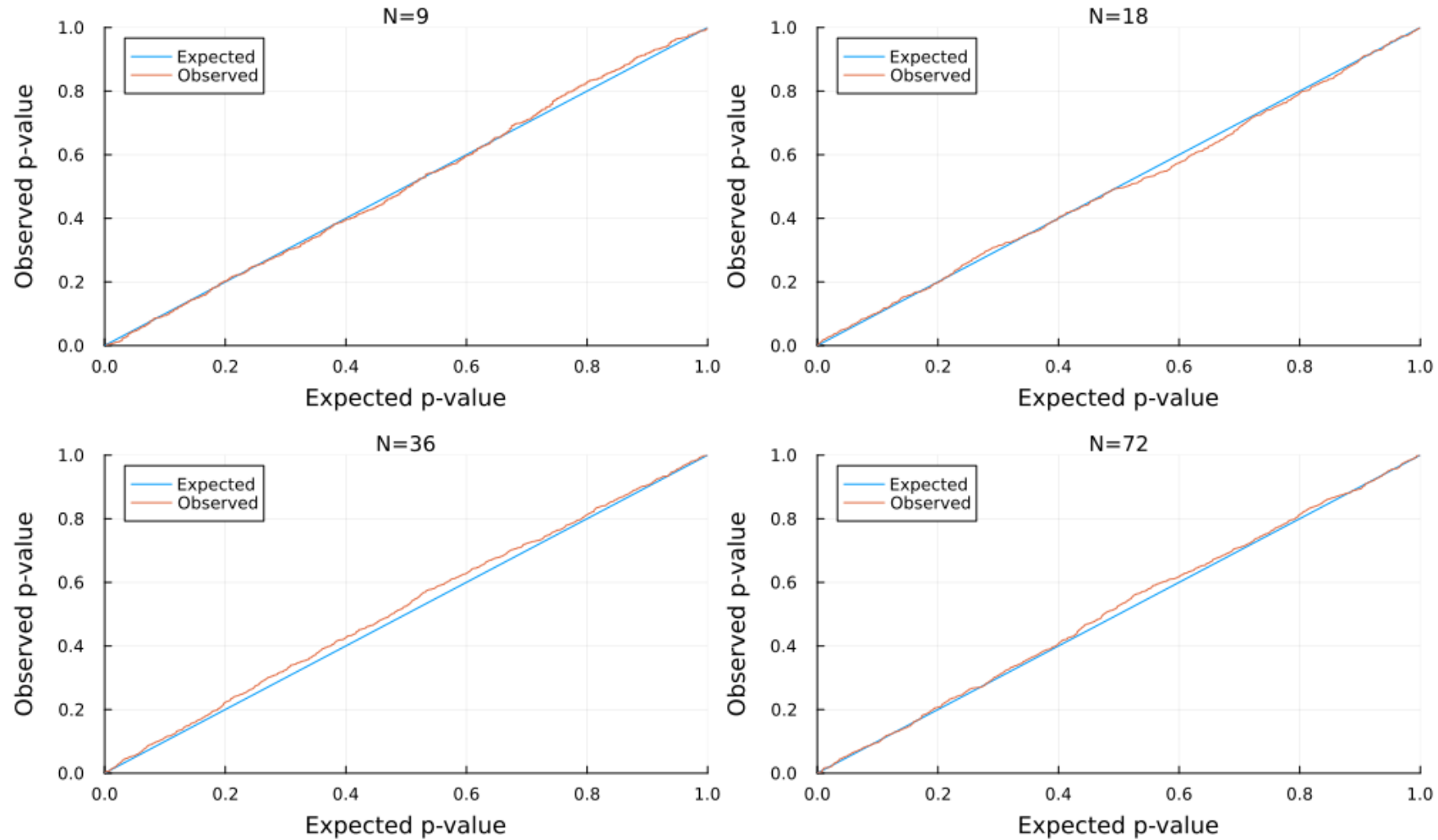
Univariate correlation test. 1000 simulations

The p-p plot is close to a 45° line, as expected, regardless the number of observations (N)

Univariate ANOVA Ind. Samples. 1000 simulations

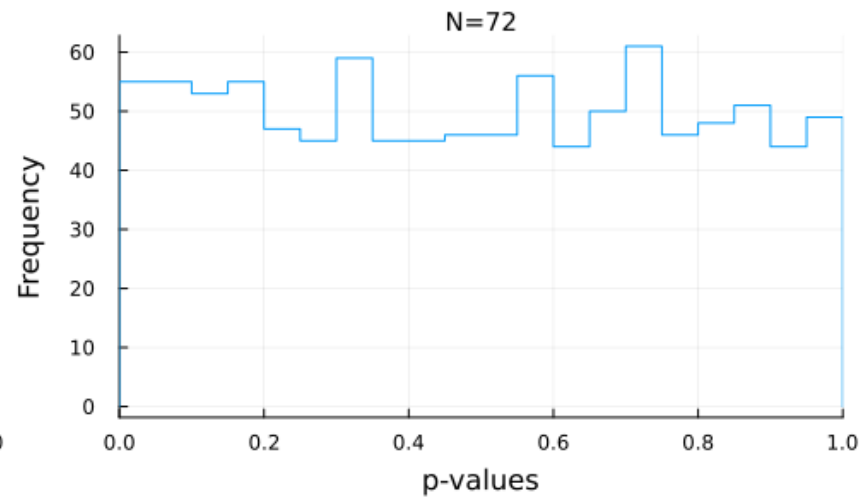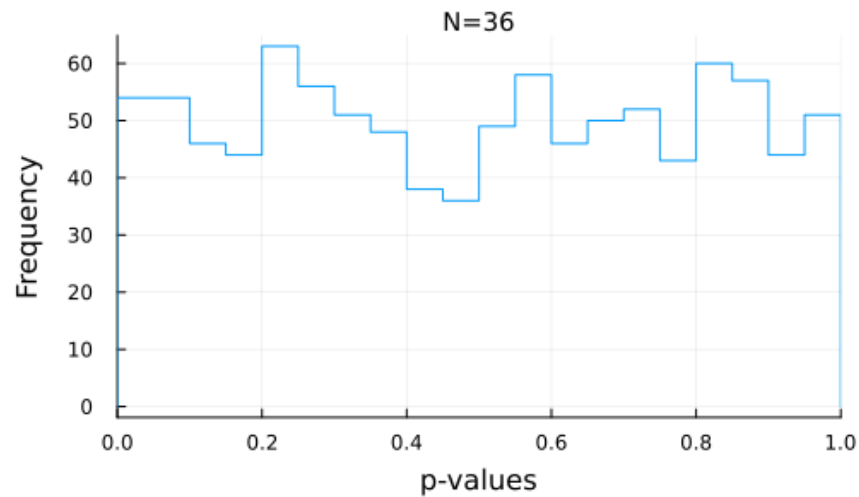

The histogram of p-values is uniform, as expected under H0, regardless the number of observations (N)

Univariate ANOVA Ind. Samples. 1000 simulations

The p-p plot is close to a 45° line, as expected, regardless the number of observations (N)

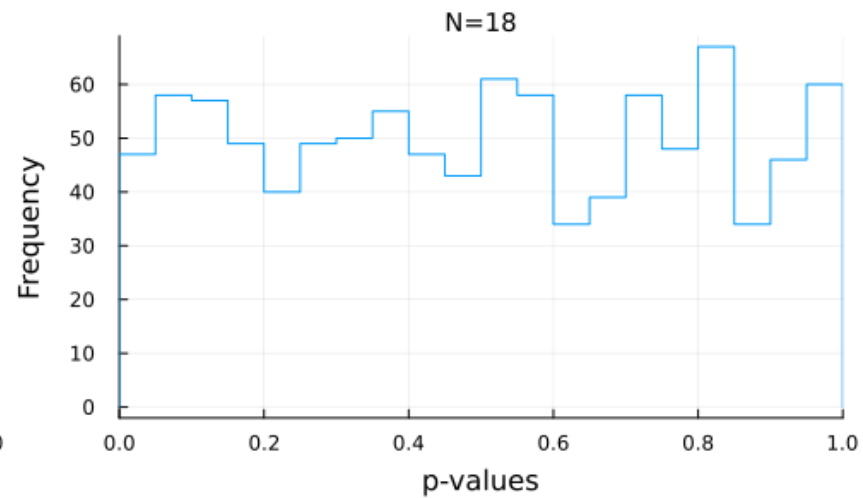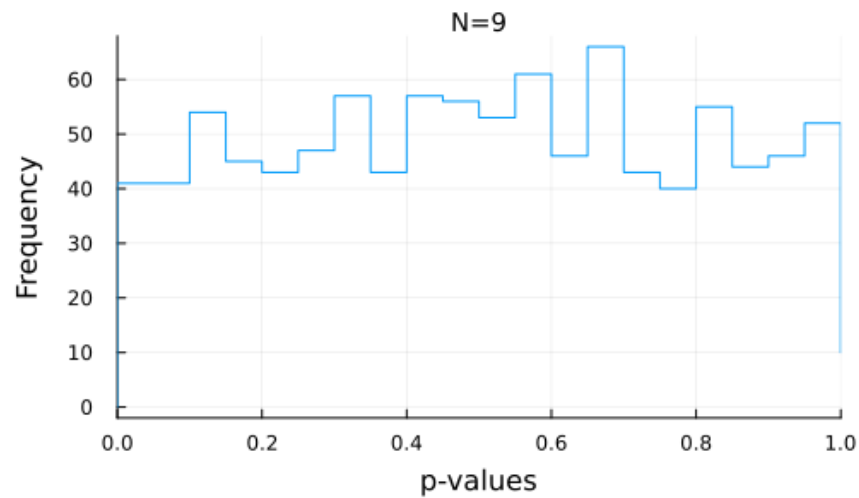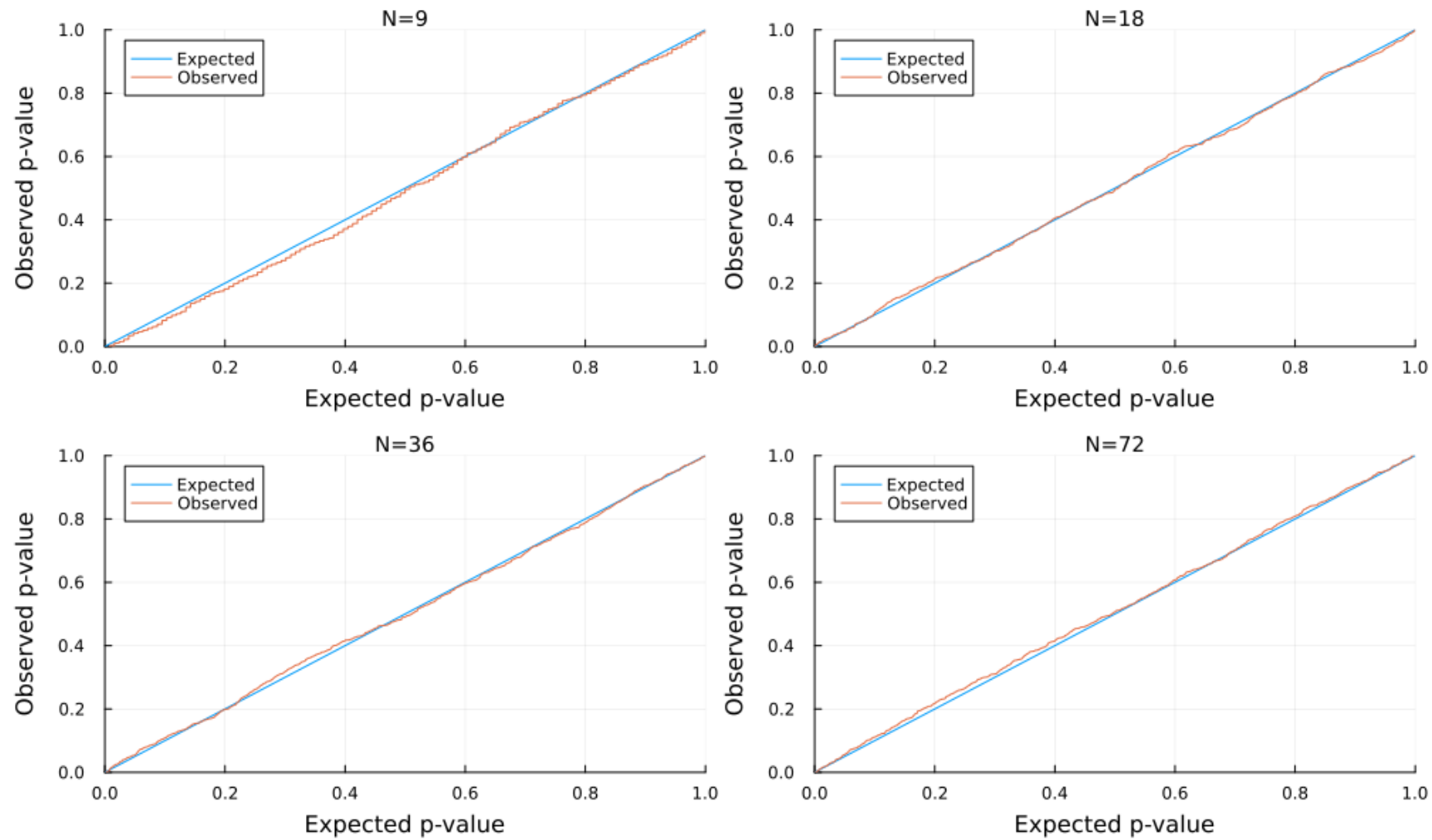# Univariate t-test Ind. Samples. 1000 simulations

The histogram of p-values is uniform, as expected under H0, regardless the number of observations (N)
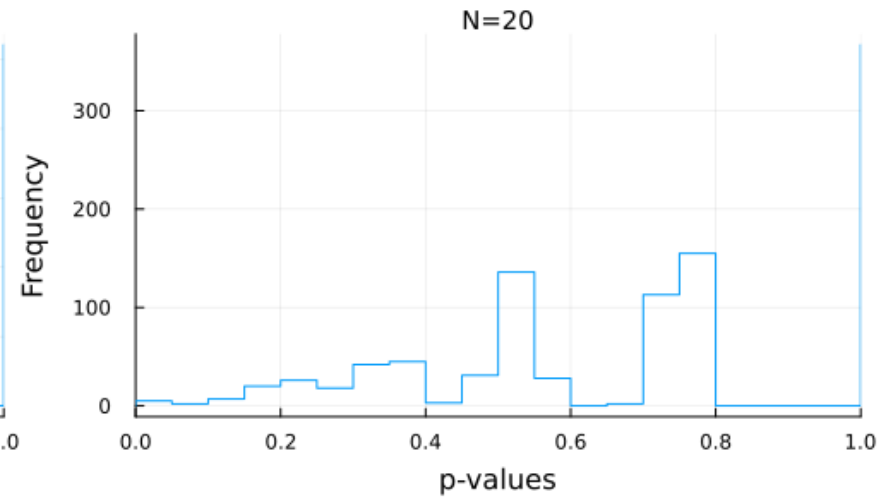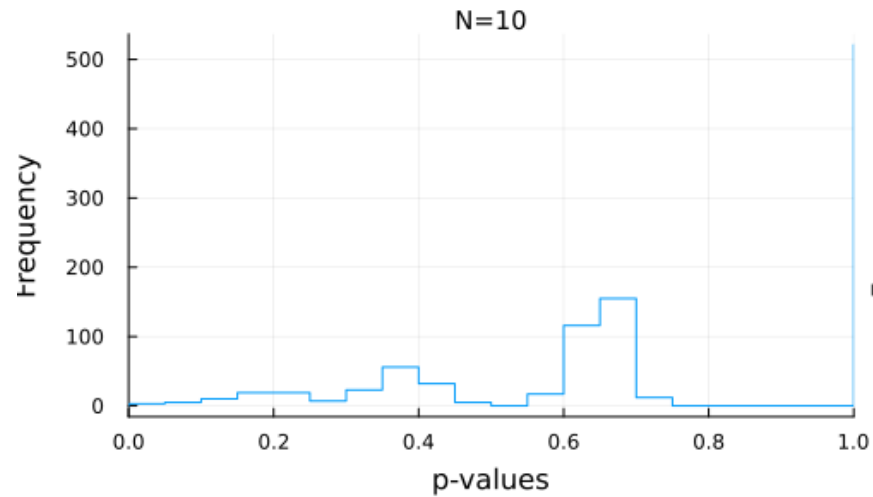
Univariate t-test Ind. Samples. 1000 simulations

The p-p plot is close to a 45° line, as expected, regardless the number of observations (N)

Chi-Square . 1000 simulations

N=expected frequency of the input table

K=number of columns of the input table

The histogram of p-values is not uniform. For more than 2 columns, a systematic bias appears
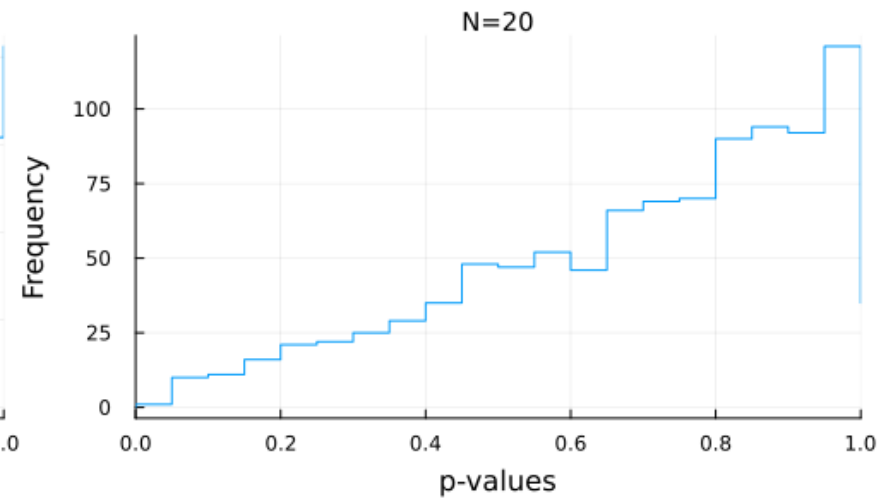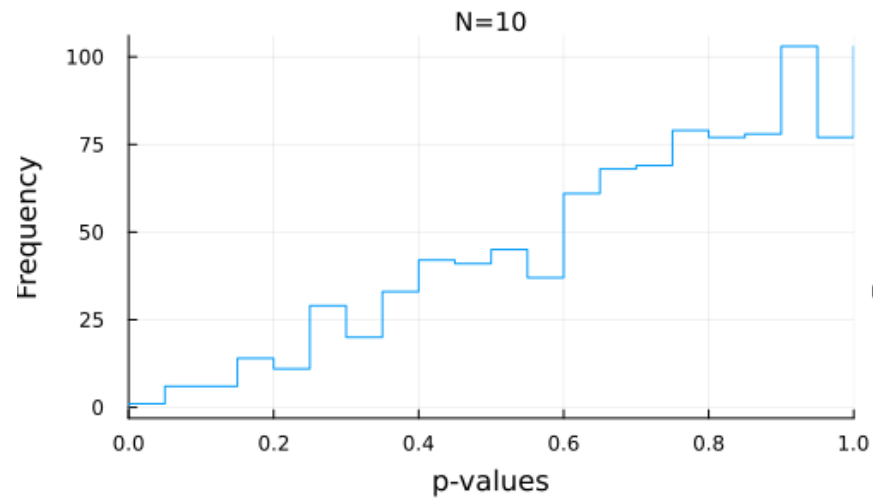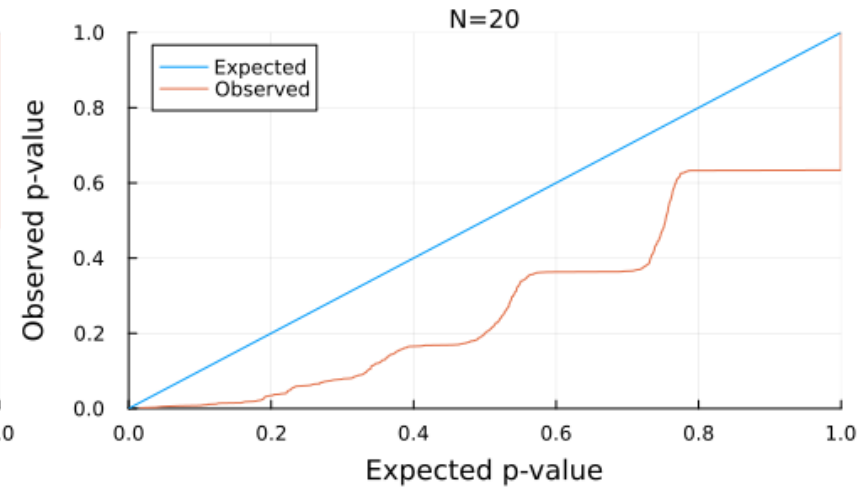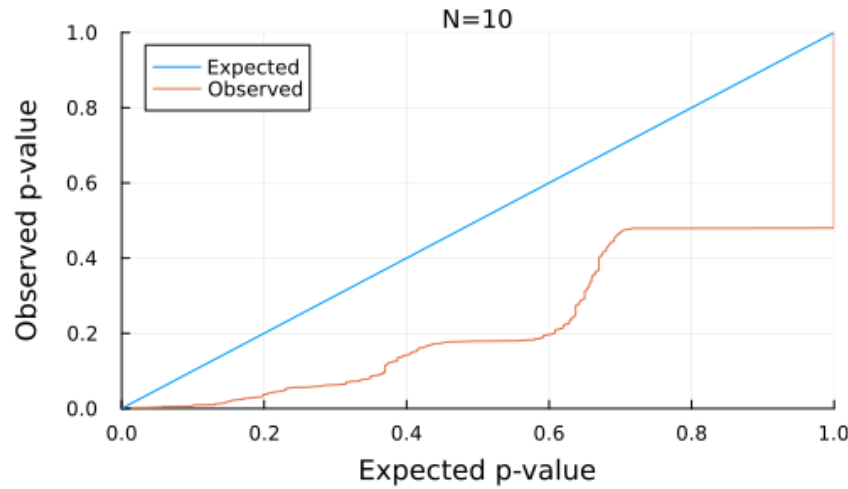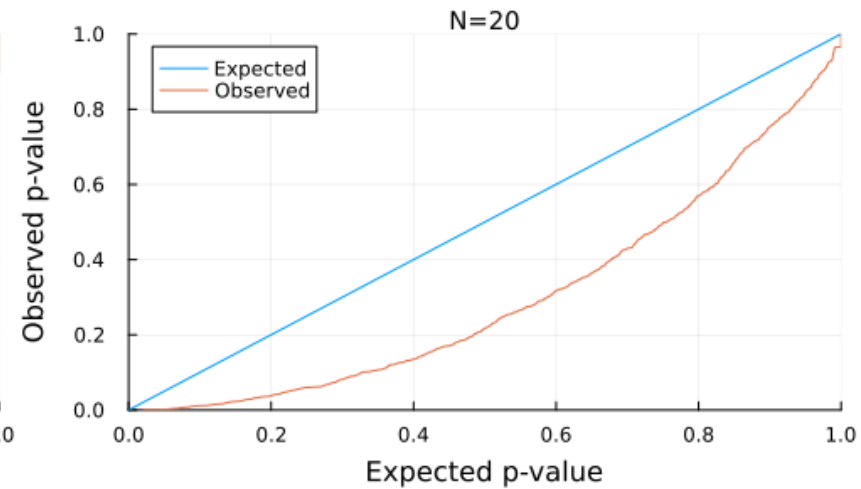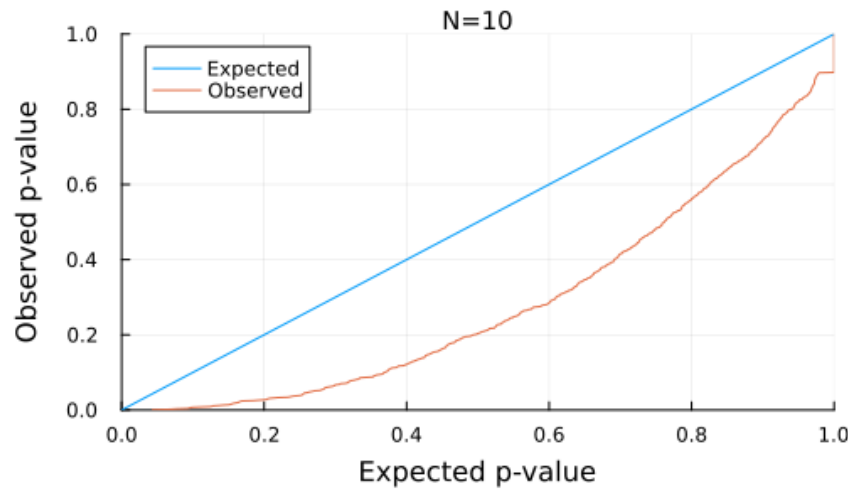
Chi-Square . 1000 simulations

N=expected frequency of the input table
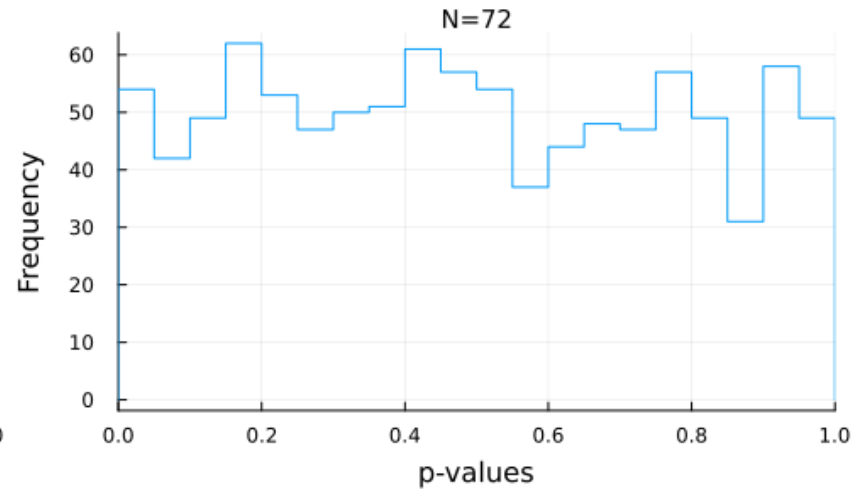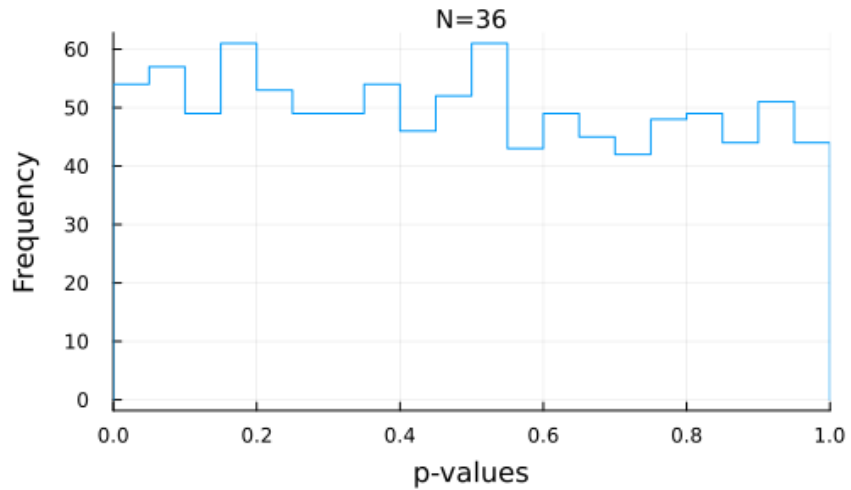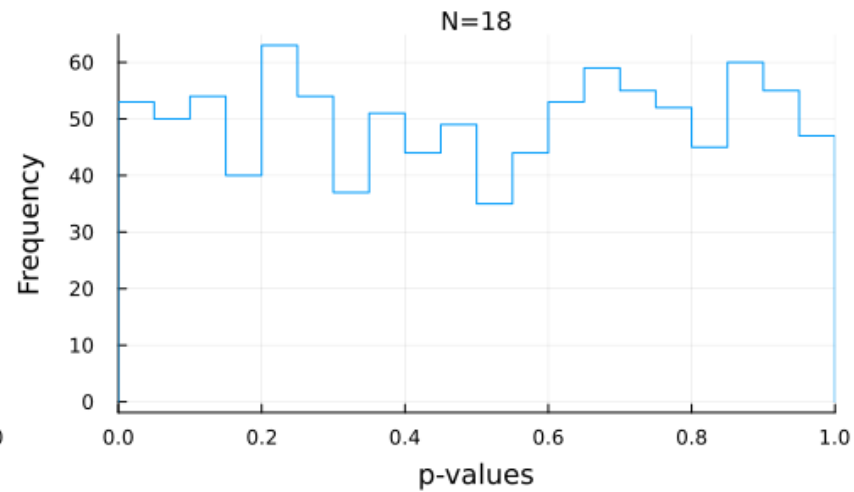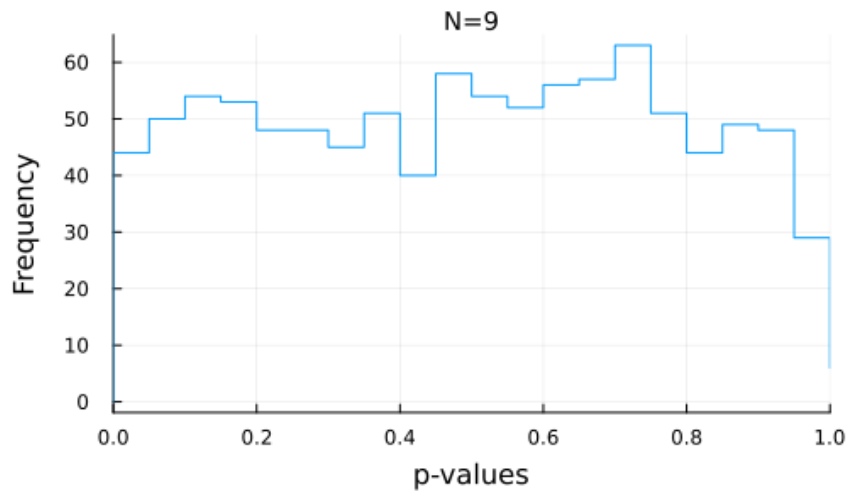
K=number of columns of the input table
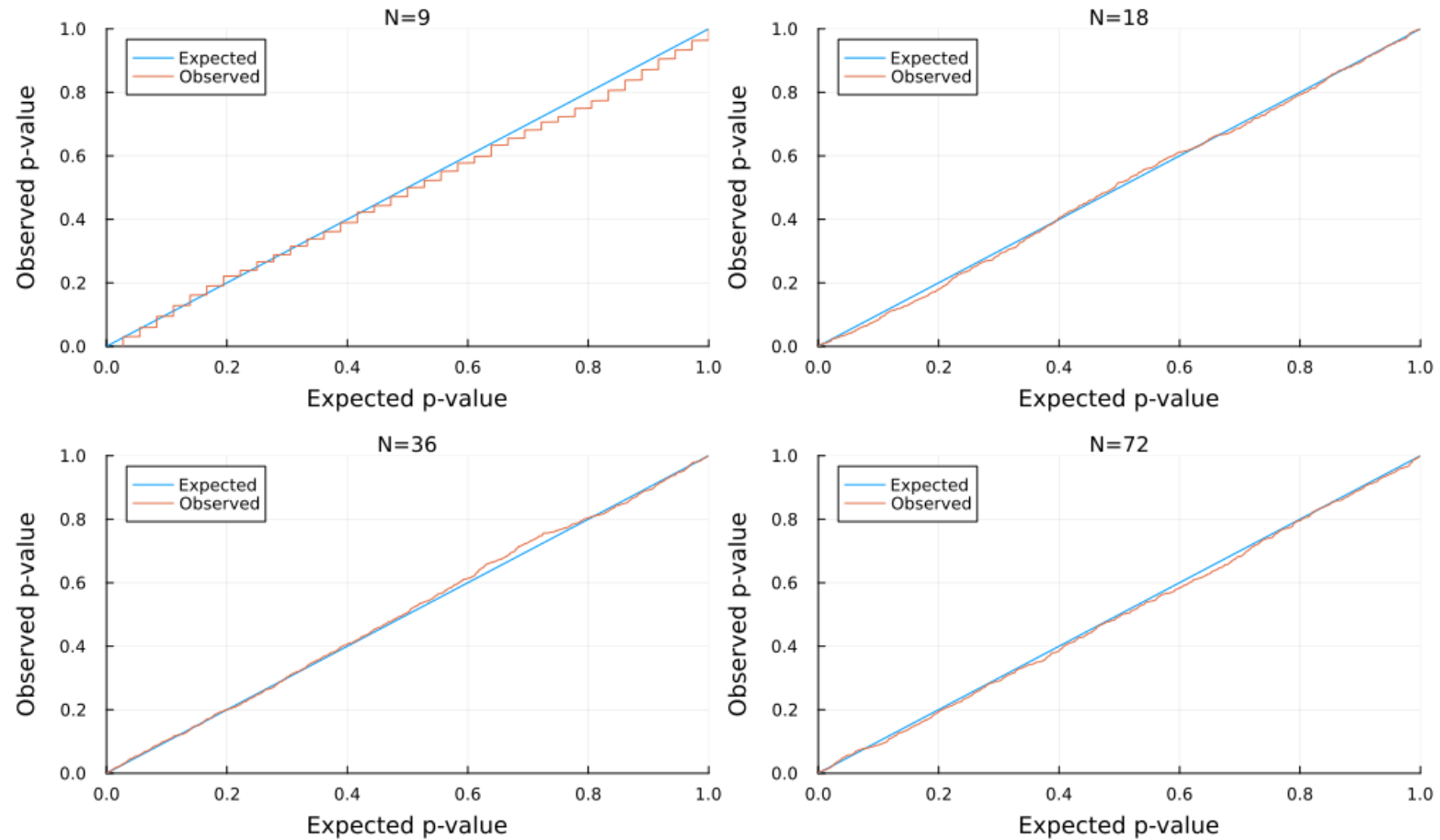

K=2

K=4

The p-p plot shows there is a problem

Univariate ANOVA Rep. Measures. 1000 simulations

The histogram of p-values is uniform, as expected under H0, regardless the number of observations (N)
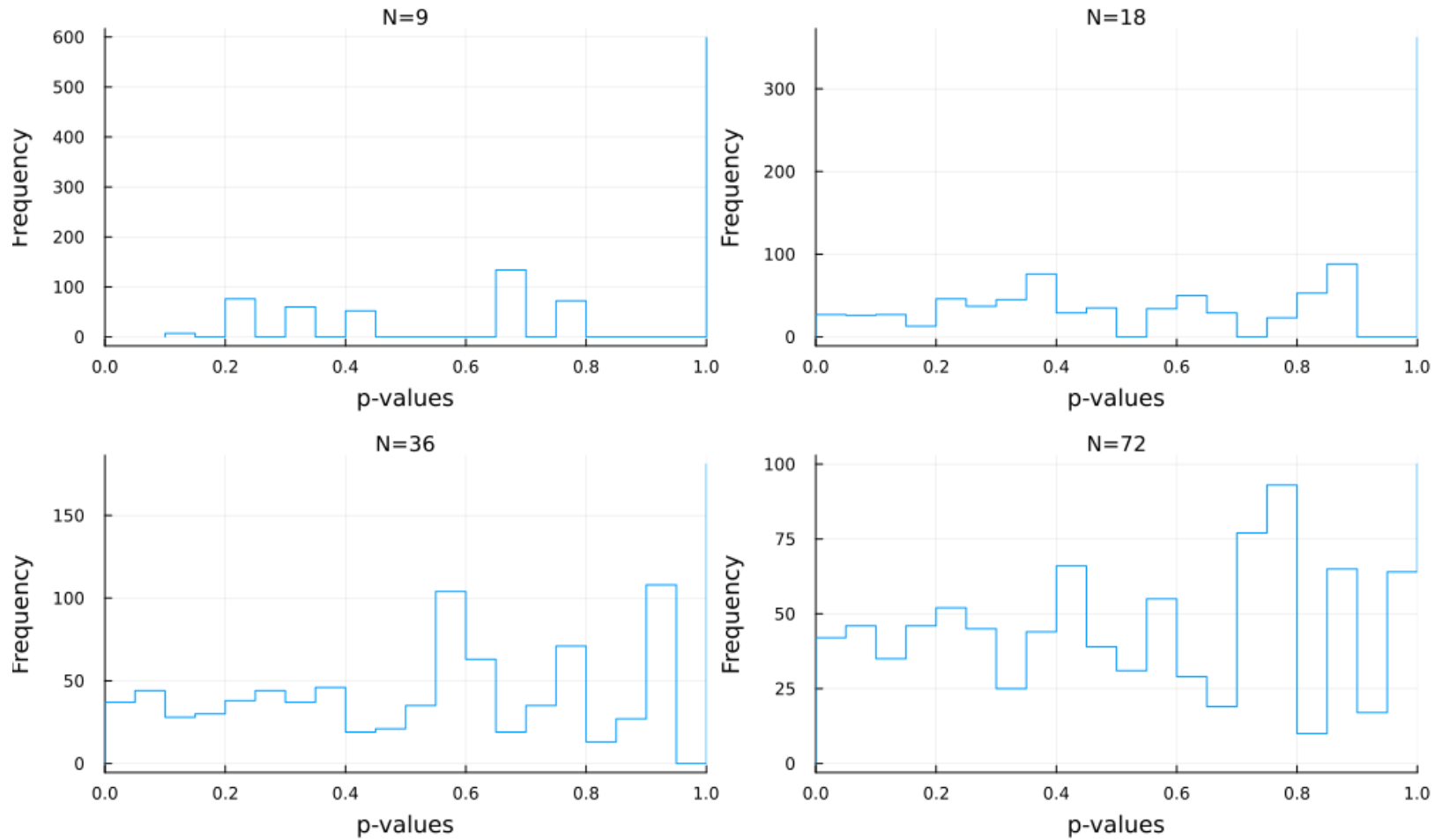
Univariate ANOVA Ind. Samples. 1000 simulations

The p-p plot is close to a 45° line, as expected, regardless the number of observations (N)
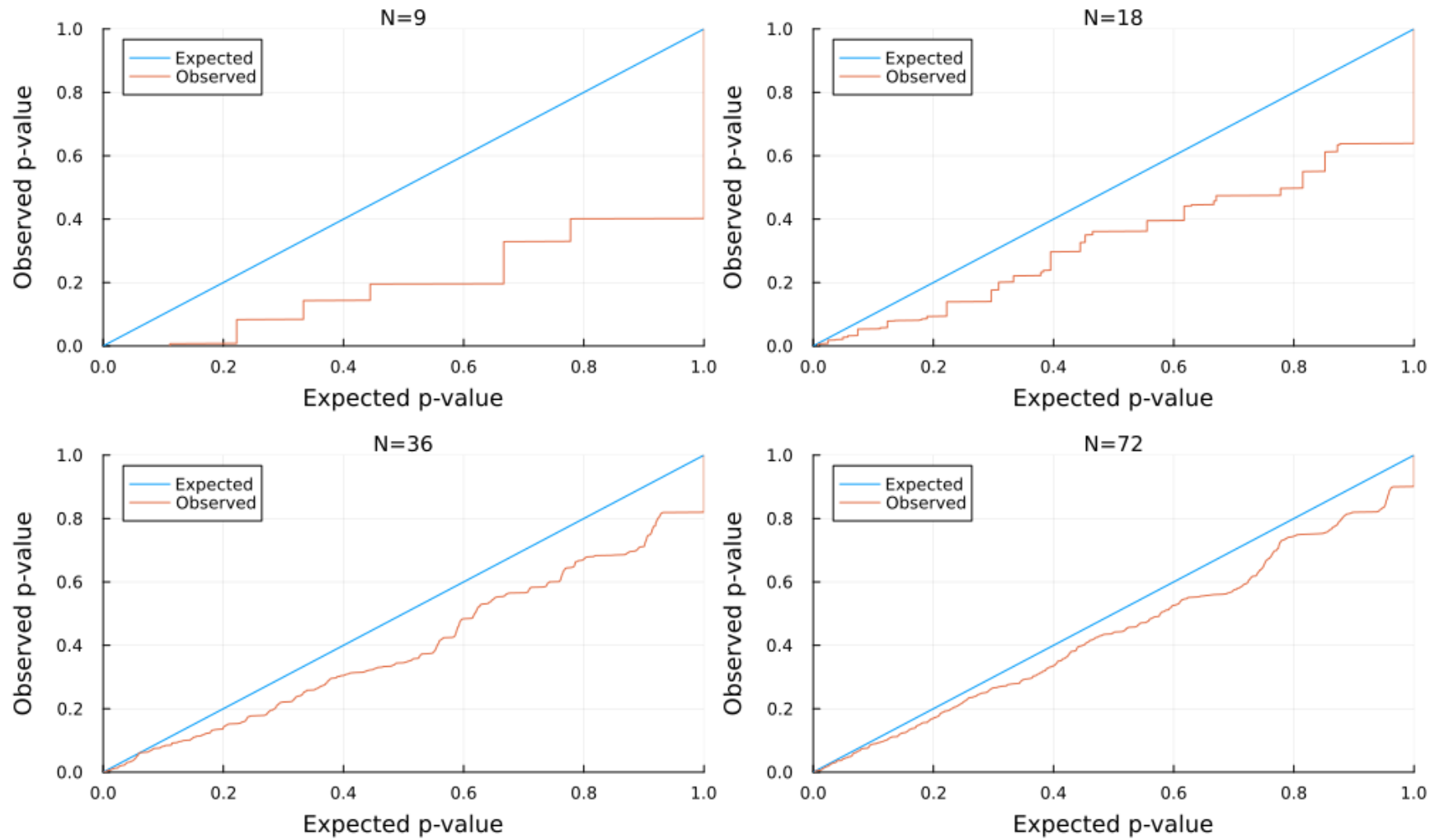
Cochran Q . 1000 simulations

The histogram of p-values is not uniform. The 1.0 value dominates
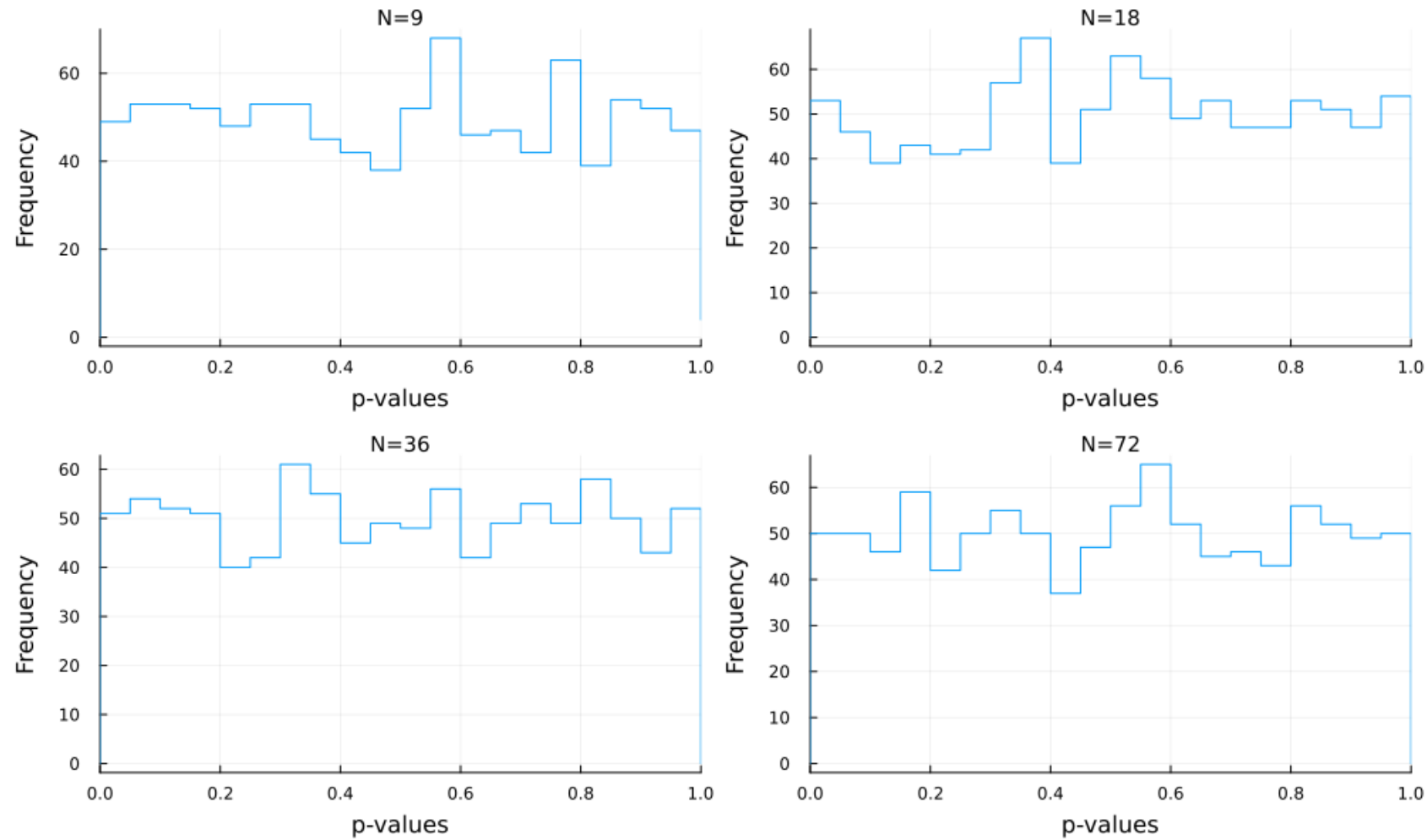
Chi-Square . 1000 simulations
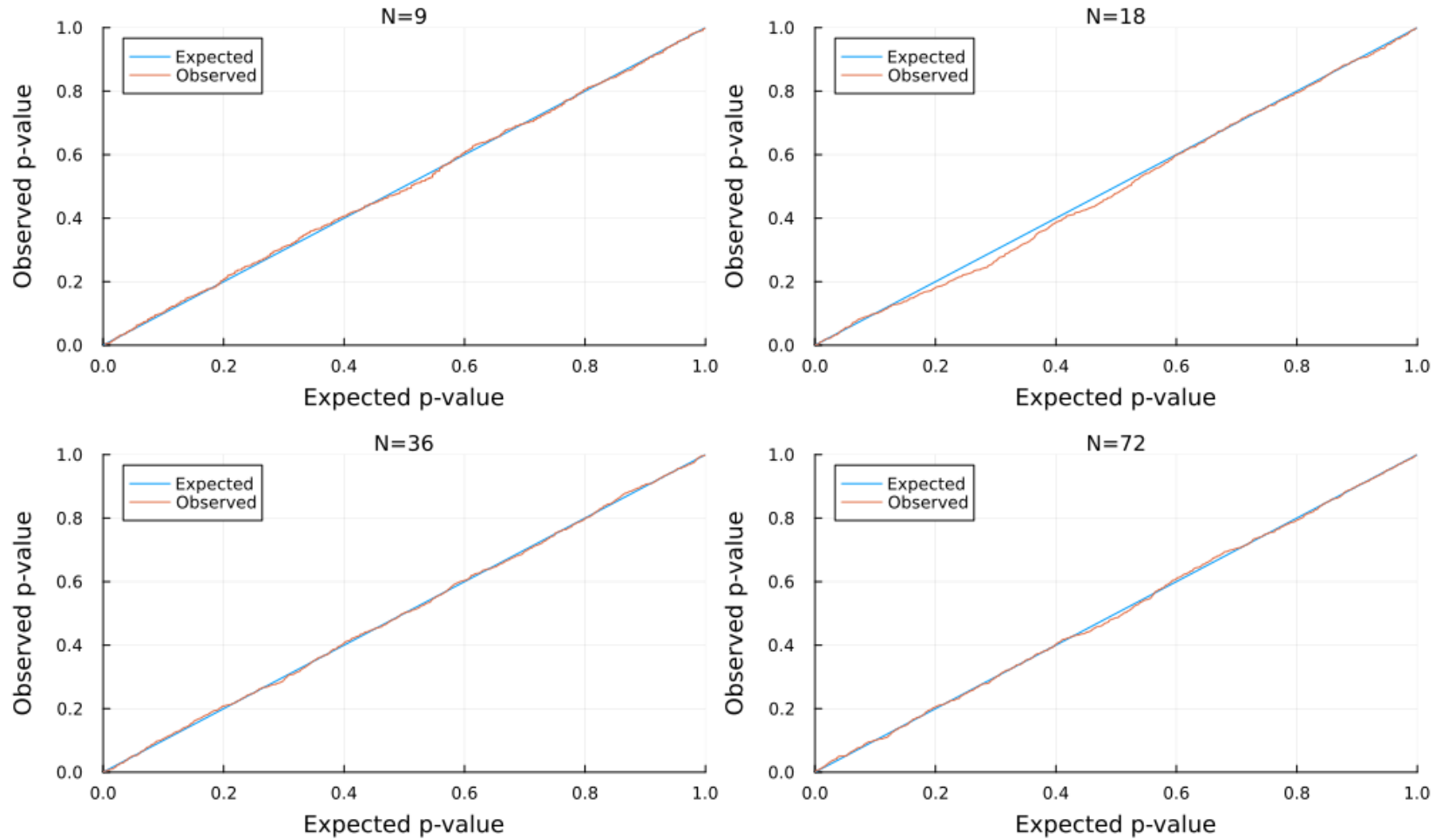
3 columns of the input table

The p-p plot shows approaches the expected for as N grows

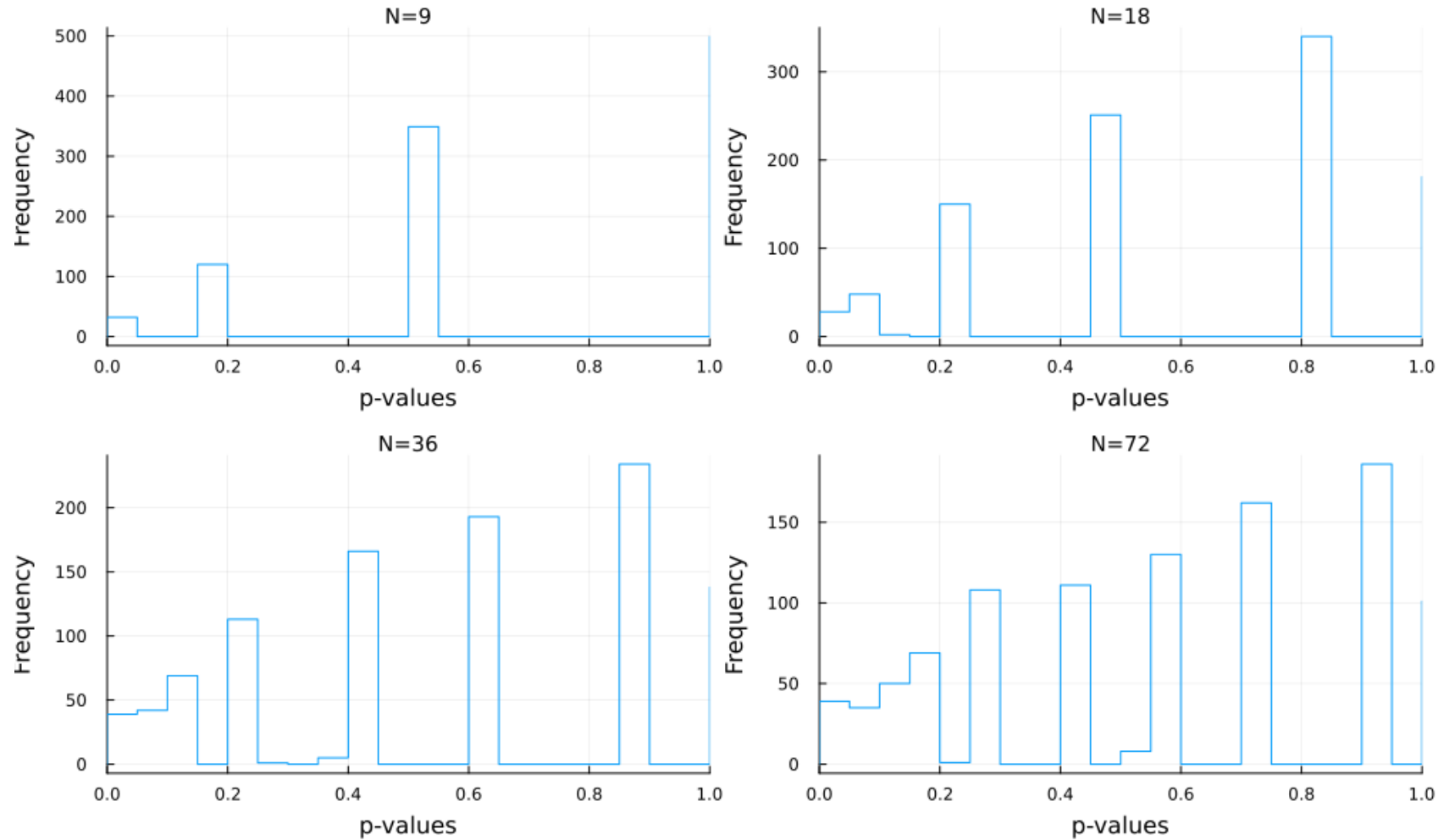# Univariate one-sample t-test. 1000 simulations

The histogram of p-values is uniform, as expected under H0, regardless the number of observations (N)

Univariate one-sample t-test. 1000 simulations
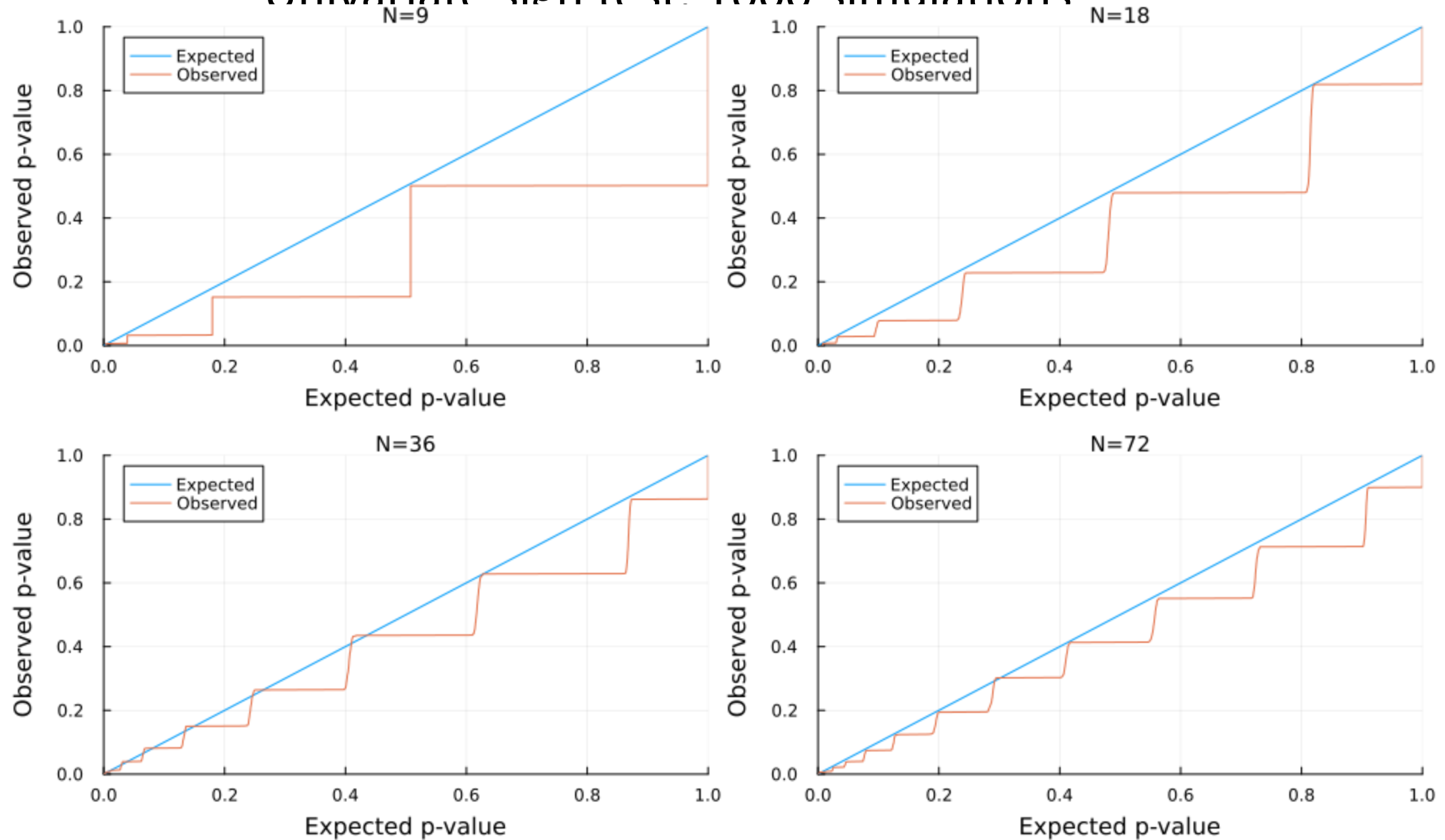

The p-p plot is close to a 45° line, as expected, regardless the number of observations (N)

Univariate sign test. 1000 simulations

The histogram of p-values is not uniform, regardless the number of observations (N)

Univariate sign test, 1000 simulations

The p-p plot approaches the 45° line as N grows

Multiple Comparison Tests

100 simulations generating random Gaussian data. Various settings for the number of observations in each test