Assignment 2 **SDA-2020** **Date: 20.10.2020**

1. Pick 1000 samples several times from standard normal distribution N(0,1): name them St_1, St_2, St_3, St_4 etc. Compute $St_1^2+St_2^2$ and all possible combinations with Sts. Plot the histogram and compare with the χ^2 (2) pdf. Compute $(St_1)^2 + (St_2)^2 + (St_3)^2 + (St_4)^2$. Compare the plot with χ^2 (4) pdf. Similarly do the computation for others and plot χ^2 histograms for several degrees of freedom. Write the conclusion. Note: [χ^2(v),v: Degrees of freedom].

2. Suppose Z~N(0,1), V~ χ^2(v), v: Degrees of freedom, Let t= Z/sqrt(V/v); Simulate t taking χ^2 (v) as simulated from the previous question. (Take v=3, 5, 10, 15 etc).

Plot t histograms for v=(3, 5, 10, 15). In the same plot show the standard normal distribution Z pdf. Try to infer about the relationship between t distribution and standard normal distribution Z.

3. $F(n_1,n_2)= (U_1/n_1)/(U_2/n_2)$; U_1 has χ^2 distribution with n_1 degrees of freedom. U_2 has χ^2 distribution with n_2 degrees of freedom. Get the corresponding simulations for χ^2 from question no. 1 and plot F(2,3). Plot other F histograms using the other χ^2 data obtained in Q1 with different degrees of freedom.

4. Simulate multivariate normal data for 3 variables and 100 observations.
A. Check for univariate marginal tests by Q-Q plot.
B. Check for bivariate and multivariate normality.

Try to do it by writing program rather than using libraries.