Department of Economics
Statistical Methods for Finance

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by October 18

Exercise 1
– Compute the first, the second and the third quartile of a random variable $X \sim N(5,2)$

– Compute the first, the second and the third quartile of a random variable $X \sim \chi^2(df = 3)$

– Compute the first, the second and the third quartile of a random variable $X \sim Binom(30, 0.4)$

Exercise 2
– For a random variable $X \sim N(0,1)$, compute $\Pr(2.2 < X < 3.2)$

– For a random variable $X \sim t(df = 6)$, compute $\Pr(X > 4)$

– For a random variable $X \sim Binom(10, 0.6)$, compute $\Pr(X \leq 3)$

Exercise 3
– Generate 1000 random numbers from a $N(5, 2.5)$, from a $\chi^2(df = 3)$ and from a $Binom(30, 0.4)$ and compute, for each distribution, the mean and the variance. Also, check that these values are similar to the theoretical ones

Exercise 4
– Provide a graphical representation of the density and of the cumulative distribution function of the following random variables: $X_1 \sim N(0,1), X_2 \sim N(3,1), X_3 \sim (0,5)$

– Provide a graphical representation of the density and of the cumulative distribution function of the following random variables: $X_1 \sim t(df = 7), X_2 \sim t(df = 5), X_3 \sim t(df = 2)$

– Provide a graphical representation of the density and of the cumulative distribution function of the following random variables: $X_1 \sim Binom(30, 0.4), X_2 \sim Binom(20, 0.3), X_3 \sim Binom(10, 0.2)$

Exercise 5   – Generate 1000 random numbers from two normal distributions with different parameters and compute mean and variance of a linear combination of the two, checking that the empirical values are coherent with the theoretical ones

Exercise 6   – Generate 1000 random numbers from two normal distributions with mean equal 0 and variance equal to 1. By means of an appropriate transformation, use them to generate a chi-square distribution. Check, using the histogram and the plot of the chi-square density function (with the appropriate number of degrees of freedom), that the empirical distribution is similar to the theoretical one

Exercise 7   – During the last Stats exam, the following marks have been assigned:

$$21, 24, 30, 18, 25, 27, 21, 20, 18, 30, 27, 21, 23, 23, 30, 21, 18, 25, 30, 28$$

Also, the gender of each student is

$$M, F, F, F, M, F, M, F, M, M, F, M, F, M, M, M, F, F, M, M$$

– Create two variables (Mark and Gender) assuming the values reported above
– Show the table of absolute, relative and percentage frequencies for both variables
– Show the contingency table with absolute, relative and percentage frequencies
– Compute row and column marginal distributions
– Compute the conditional distribution of the Mark variable across the categories of the Gender variable