

Exercise 1

Take the Excel file and

- 1) Plot the ECDF of the sample
- 2) Plot a histogram of the sample, selecting the right bucket width. Try using Excel function *frequenza* or the menu tab *analisi dei dati*.
- 3) Compute the mean, median, mode, quartiles and IQR
- 4) Are there outliers beyond the 1.5 IQR limit (both above and below)?
- 5) Plot a Lorenz curve of the sample
- 6) Compute the sample variance, MAD and Lorenz Curve gap
- 7) Fit the sample to a Normal distribution, and estimate the mean and variance of the above Normal from the fitting equation
- 8) Discuss fitting the sample to a Uniform distribution. Is this a good idea? Why? What is the result in any case?
- 9) Discuss fitting the sample to an Exponential distribution. Is this a good idea? Why? What is the result in any case?

Exercise 2

Using the Excel functions, compute how good an approximation the following formula is for the standard Normal percentiles:

$$t_i = 4.91 \cdot \left[i^{0.14} - (1-i)^{0.14} \right]$$

Plot the absolute relative error as a function of the percentile. Where are the highest errors?

Exercise 3

Use the *random (casuale)* Excel function to generate $n=1000$ random numbers taken from $U(0,1)$.

- 1) Show that these numbers are uniformly distributed.
- 2) Estimate the mean using
 - a) the sample mean of the observations
 - b) the MLE for the uniform
- 3) assume that the population mean is $\mu = 0.5$. Plot a graph of $|\mu - \bar{X}|$ and $|\mu - MLE|$ against the number of observations in the sample, and observe which of the two converges faster.