

## Assignment 1

1. Find the moment generating function (mgf) of the distribution  $\frac{1}{\theta} e^{-x/\theta}$  for  $t < 1/\theta$ . Here  $x$  is greater than equal to zero and  $\theta$  is greater than zero. Find variance  $V(X)$  from mgf.
2. Jenny receives emails that consist of 18% spam of those emails. The spam filter is 93% reliable i.e., 93% of the mails it marks as spam are actually spam and 93% of spam mails are correctly labeled as spam. If a mail is marked spam by her spam filter, determine the probability that it is really spam.
3. Dr. Williams administers a math-stat test to his class of 75 students. The mean score (out of 300 possible points) is 235. From previous studies, you know the population standard deviation is 28. Using the sample data given, calculate a 95% confidence interval for the population mean.
4. A data set is given on 8 countries, where COR measures the corruption in the country on a scale of 0 (least) to 10 (most) and INC measures the per capita GDP in thousand US dollars.

Nation	Brazil	Bulgaria	Canada	Chile	China	Ukraine	UK	USA
COR	5.9	6.7	0.8	3.1	6.6	7.4	1.4	2.5
INC	6.1	4.1	22.4	12.5	3.6	2.2	21.2	31.5

- a. Find sample means rounded up to 3 decimal places.
- b. Work with demeaned data. Estimate the following regression using ordinary least squares method. Report coefficients up to 3 decimal places.

$$INC_i = \beta_0 + \beta_1 COR_i + \epsilon_i$$

- c. Compute residual sum of squares of the model. Report the number up to 3 decimal places.