

## HW 1

- Adopted from Rizzo's textbook:

p. 94, Q3.1

1. Write R code to generate and return a random sample of size  $n$  from the two-parameter exponential distribution  $\text{Exp}(\lambda, \eta)$  for any  $n$ ,  $\lambda$ , and  $\eta$ . Draw the ecdf and the theoretical cdf on the same chart to make sure the algorithm works properly.

- Additional:

2. Generate 10,000 sums of squares of 5 independent standard normal variables. Compare the histogram of their distribution to the density of the appropriate  $\chi^2$  distribution. Estimate the mean and variance of the distribution and compare to the true values.
3. Generate 10,000  $\text{Exp}(1)$  random variables. Use `density()` to plot the empirical density and compare it to the true exponential density.
4. Let  $\mathbf{Y} = (U, V)$ , where  $U$  and  $V$  are independent standard normal random variables. Estimate the mean of the geometric length of the random vector  $\mathbf{Y}$ . (That is the average distance from the random point  $(U, V)$  to the origin of the coordinate system.)