

# DATA130004: Homework 5

Due in class on November 23, 2017

1. Prove that the  $k$ -level trimmed mean estimator has expectation zero when  $n$  random samples are independently generated from standard normal distribution.
2. Exercises 6.1, 6.4.
3. In Example 6.4, to construct a  $(1 - \alpha) \times 100\%$  confidence interval for the variance parameter  $\sigma^2$ , we assume that the lower bound is 0 and the upper bound corresponds to a quantity involving the  $\alpha$ -quantile of a  $\chi^2$  distribution, we now consider using  $\alpha/2$  and  $(1 - \alpha/2)$ -quantiles of the same  $\chi^2$  distribution to construct another confidence interval. It certainly will excludes 0.
  - (1) Give the explicit form of the new confidence interval and justify its validity by showing the theoretical confidence level is  $1 - \alpha$ .
  - (2) Repeat the experiments in Example 6.5 with the same parameter set-up. Compare the two types of confidence interval, such as empirical coverage probability and average confidence interval width.
  - (3) Repeat the experiments in Example 6.6 with the same parameter set-up. Compare the two types of confidence interval, such as empirical coverage probability and average confidence width.
  - (4) Which confidence interval would you recommend in practice? Explain why.