University of California, Santa Cruz Department of Applied Mathematics and Statistics Baskin School of Engineering Classical and Bayesian Inference - AMS 132

## **Review and Example: Properties of estimators**

- 1. Suppose that  $X_1, ..., X_n$  form a random sample from the exponential distribution with rate  $\lambda$ .
  - (a) Find the M.L.E. of  $\lambda$ .
  - (b) Find the Fisher information,  $I(\lambda)$ , in the random sample.
  - (c) Find the asymptotic distribution of the M.L.E. and based on this distribution find a symmetric approximate 95% confidence interval for the rate of the exponential distribution.
  - (d) From a random sample of size 150, it was observed that the sum of the random variables is 6.52.
- 2. Suppose that  $X_1, ..., X_n$  form a random sample from the normal distribution with mean 0 and variance  $\sigma^2$ .
  - (a) Find the M.L.E. of the standard deviation,  $\sigma$ .
  - (b) Find the Fisher information,  $I(\sigma)$ , in the random sample.
  - (c) Find the asymptotic distribution of the M.L.E. of  $\sigma$  and based on this distribution find a symmetric approximate 95% confidence interval for the standard deviation of the normal distribution.