Homework to Week 1

Statistics: Principle, Methods and R (II)

Gao Fengnan

Week 1, 27 Februray 2017

The homework is due on Monday, 6 March 2017. Please hand in the solutions to the teaching assistant He Siyuan at the beginning of the lecture.

1. Obtain a $1-\alpha$ confidence interval for estimating the Bernoulli success probability p with observations $X_1, \ldots, X_n$ using the following result coming from applying Hoeffding's inequality. (Note $b = 1$ and $a = 0$ in the Bernoulli case.)

$$\mathbb{P}(\sqrt{n}\,\overline{X}_n \geq t) \leq \exp\Big(-\frac{2t^2}{(b-a)^2}\Big).$$

2. Let $X_1, \ldots, X_n \sim \text{Uniform}(0, \theta)$. Let $f(\theta) \propto 1/\theta$. Find the posterior density.

3. Consider the Bernoulli(p) observations

$$0 \quad 1 \quad 0 \quad 1 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0.$$

   Plot the posterior for p using these priors: Beta(1/2, 1/2), Beta(1, 1), Beta(10, 10) and Beta(100, 100).