

Assignment 5

PM522b Introduction to the Theory of Statistics Part 2

Due: February 27, 2018

1. Find the maximum likelihood estimators for a p-parameter logistic regression model. Simulate some data and use R to solve for a logistic regression model with one independent variable (don't forget about the intercept).
2. Central moments are defined as $\mu'_k = E[(x - \mu)^k]$. For $X_1, \dots, X_n \stackrel{iid}{\sim} N(\mu, \sigma^2)$ find the 2nd, 3rd, and 4th central moments, and describe what they represent.
3. Are the method of moments estimators unique? For X_1, \dots, X_n iid $\text{Poisson}(\lambda)$, show that $\frac{1}{n} \sum_{i=1}^n X_i$ and $\frac{1}{n} \sum_{i=1}^n X_i^2 - (\frac{1}{n} \sum_{i=1}^n X_i)^2$ are moment estimators of λ .
4. Find the method of moments estimators for $X_1, \dots, X_n \stackrel{iid}{\sim} \text{Gamma}(\alpha, \beta)$. Revisit the MLEs for α and β saw in class and make a brief comparison (you may want to use R to do some computations).
5. Suppose we have a sample of data from an exponential distribution. Using Bayes rule, sketch out the posterior distribution for the unknown parameter assuming a Gamma prior.