Homework 6: Practice Problems, Exam II

STA-360/602, Spring 2019 (These are not to be turned in for credit)

Recommend completing by February 26, 2019

1. 3.14, part d in Hoff. (Unit information prior).
2. (Normal-Normal) Derive the posterior predictive density $p(x_{n+1}|x_{1:n})$ for the Normal–Normal model covered in lecture. Hint: There is an easy way to do this and a hard way. To make the problem easier, consider writing $X_{n+1} = \boldsymbol{\theta} + Z$ given $x_{1:n}$, where $Z \sim \mathcal{N}(0, \lambda^{-1})$.)
3. Work through section 10.3 in the Hoff book. (Metropolis).
4. Go through Labs 4–6.
5. (Monte Carlo and the inverse CDF method) Suppose we wish to sample from the conditional distribution of $X \mid X < c$, where $X \sim \mathcal{N}(0, 1)$ and $c \in \mathbb{R}$. You may assume the following:
   - you can generate Uniform$(0, 1)$ random variables, and
   - you can evaluate both the c.d.f. $F(x)$ and the inverse c.d.f. $F^{-1}(u)$ of the $\mathcal{N}(0, 1)$ distribution.

   How would you draw samples from $X \mid X < c$?
6. Prove that the full conditional distributions $f(x \mid y)$ and $f(y \mid x)$ determine the joint distribution of $f(x, y)$.