

ST 740 Midterm Study Guide

I will provide a sheet with p.d.f.'s for any distribution that you need on the midterm.

1. "Posterior is proportional to prior times likelihood." Given a prior and a sampling distribution, write down the posterior up to the normalizing constant.
2. Define informative prior, diffuse/flat prior, conjugate prior, improper prior
3. Define elicitation and describe what it means to do elicitation well.
4. Given a sampling distribution, derive the Jeffreys' prior.
5. Given a sampling distribution, propose a conjugate prior and show that it is conjugate.
6. Know the Jeffreys' priors for the mean of the normal distribution when the variance is known, the variance of the normal distribution when the mean is known, and for p from a binomial distribution
7. Given a sampling distribution and a posterior distribution, write down the integral expression for the posterior predictive distribution. Describe how you would generate samples from the predictive distribution. Calculate an analytic solution for the predictive distribution in simple cases.
8. Given a two-dimensional posterior distribution, write the integral expression for the marginal distribution of one of the parameters.
9. For the normal sampling distribution with μ and σ^2 unknown and the non-informative prior we discussed in class, know the marginal and conditional distributions and how to use them to get a sample from the joint distribution.
10. Know the joint and marginal posterior distributions for a multinomial sampling distribution with a Dirichlet prior.
11. State the algorithm for brute force sampling, rejection sampling, SIR sampling.

12. Describe how you choose the number of samples to generate and how you calculate Monte Carlo error.
13. Describe how to get a sample from the marginal posterior for a parameter given that you have a sample from the joint posterior distribution.
14. Describe how to get a sample from the posterior distribution of a function of parameters given that you have a sample from their joint posterior distribution.
15. Define an induced prior and describe why you might want calculate one.
16. Describe how to “calculate” the posterior mean, median, variance, standard deviation, central credible interval, highest posterior density interval, and $P(\theta > k)$ given a sample from the posterior distribution.