

I was pleased with your overall performance, particularly on Section A. The learning outcomes examined by the questions and some common problems are discussed as follows.

A1(a) is on applying the Bayes theorem; A1(b) is on calculating the distribution of a transformation of a random variable. A2(a) is on the Bayesian hypothesis testing by using posterior probabilities and losses; A2(b) is on checking whether a prior is improper. A3(a) is on figuring out the four elements of a one-parameter exponential family distribution; A3(b) is on deriving a conjugate prior based on A3(a); A3(c) is on deriving a (posterior) predictive distribution; A3(d) is on deriving a Jeffrey's prior.

A1-A3 are the basics of Bayesian inference; similar examples have been presented in tutorials or notes. I was disappointed that some students still forgot the formulae for Bayesian hypothesis testing, or failed to prove the improper prior, or failed to use the given posterior distribution to calculate the predictive distribution.

B1(a) is on a link between exchangeability and hierarchical Bayesian model; B1(b) is on a property of exchangeable variables; B1(c) is on calculating two simple full-conditional distributions, which is actually the simple Bayesian inference for normal distributions. All of these three parts can be found in notes. I was disappointed that many students completely forgot the representation theorem, and some did not realise the link between the required full-conditional distributions and the two simple cases of Bayesian inference for normal distributions/likelihoods.

B2(a) is on drawing a DAG; B2(b) is on moralisation of a DAG; B2(c) is on calculating a full-conditional distribution based on a DAG; B2(d) is on the batching method for estimating MCSE in MCMC. Some students unfortunately forgot to 'moralise' all the parents, and some forgot what the batching method is.

B3(a) is on the factorisation theorem for the joint distribution represented by a DAG; B3(b) is on the factorisation of the full-conditional distribution; and B3(c) is on how to prove B3(b) by using the Bayes rule, the factorisation theorem, and/or the Markov blanket. B3(a)-(b) can be found in notes; and many students wrote down the answers correctly, but not many provided a correct proof in B3(c).

Hope you could find this general feedback helpful.