

# Useful stuff to remember (or not!) for the MAS2903 exam

## Chapter 1

- Descriptions of the three different approaches to probability; pros and cons of each
- Formula for conditional probability
- Law of Total Probability, and proof
- Bayes' Theorem, and proof
- How to formulate a likelihood "in the usual way"; that is, assuming IID observations
- The Factorisation Theorem
- An explanation of what "sufficiency" means, in simple plain English terms
- Example 1.8 not needed for the exam
- Material on page 21 not needed for the exam

## Chapter 2

- "Posterior is proportional to prior times likelihood"
- No need to memorise PDFs for the beta and gamma distributions (page 25), nor the formulae for the mean/variance/mode for these distributions
- Remember that if  $X \sim U(0, 1)$ , then  $f(x) = 1$  and  $E[X] = 0.5$
- Useful to remember that  $\Gamma(a) = (a - 1)!$
- No need to memorise the shape of beta and gamma distributions – if knowing the shape will help, you'll probably be given a plot in the exam
- Memorise the formulae for the Binomial distribution! This is the only one you'll need to memorise!
- When discussing "Changes in beliefs in light of the data", no need to state the "likelihood mode" (e.g. Table 2.2 on page 36)
- When discussing "Changes in beliefs in light of the data", compare prior/posterior means; prior/posterior standard deviations
- Conjugacy – would be useful to know the conjugate priors to use for various scenarios (e.g. page 42)
- Memorise the results from Example 2.6!

## Chapter 3

- Make sure you know how to interpret *MATCH* output
- Might be useful to memorise definitions of "Substantial" and "Vague" prior knowledge
- Material in Section 3.3 (pages 68-72) not needed for the exam
- Could be useful to memorise the result of Example 3.10
- Memorise the formula for computing a Jeffreys prior
- The proof in Section 3.5 is non-examinable, but you should memorise the result (i.e. the formula in comment (1) on page 83)

## Chapter 4

- Memorise differences in interpretation between a frequentist and a Bayesian confidence interval
- Memorise the formula for the predictive distribution, including "Candidate's formula" (page 99)
- Material on page 103 is non-examinable