

CITS7211 Modelling complex systems sample exam part I:

SAMPLE:

1) Briefly describe the complete modeling process, from problem definition through to model verification, citing as an example a case study you have read about in this unit.

5 marks

2) Describe using an example how a Wolfram number (between 0 and 255) is able to describe 1 dimensional cellular automata

5 marks

3) Model-checking is an important process used to ensure a system meets a formal specification. Using the Dining Philosophers Problem as an example, describe the main elements of this process.

5 marks

4) Suppose that there is a restaurant that serves a number of customers (c) and employs a number of staff (s). If there are not many customers and a lot of staff then some staff are made redundant, and if there are many customers and not many staff, then new staff are employed. However, if there are many staff and not many customers, then those customers receive good service, and encourage more customers to come. However if there are many customers and not many staff then the customers receive poor service and tell their friend not to come. We would like to model the ways in which the staff numbers and customer numbers change over time.

a) Suggest a set of parameters and constants that may feature in the model. For each parameter or constant, identify its dimensions in terms of C (a number of customers), S (a number of staff) and Q (quality of service).

5 marks

b) Suggest a set of equations describing how the customer numbers and staff numbers change over time. Show that these equations are dimensionally consistent.

10 marks