Problem Sheet 2

1. Exercise 3.3 on page 92 of the Lecture Notes.

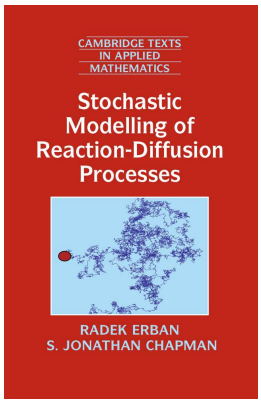
2. Exercise 3.8 on page 93 of the Lecture Notes.

3. Exercise 4.3 on page 133 of the Lecture Notes.

4. Consider the compartment-based model (4.13) of diffusion, studied in Section 4.2. Consider that the number of compartments K is large (i.e. study the formal limit $K \to \infty$) and assume that $N = 10K$. Then equations (4.24)–(4.25) imply that there will be on average 10 molecules in each compartment at the steady state. What is the probability that a given compartment will contain at least 20 molecules?

The Lecture Notes for course B5.1 are published by the Cambridge University Press:

R. Erban and S.J. Chapman, "Stochastic Modelling of Reaction-Diffusion Processes", Cambridge Texts in Applied Mathematics, CUP (2020)



The online version is available to everyone at all times through SOLO (Search Oxford Libraries Online). College libraries also have physical copies.

Students wishing to further practice material covered in Chapter 3 can choose to solve any exercise in the Lecture Notes accompanying Chapter 3 (exercises on pages 92-94). Students wishing to further practice material covered in Sections 4.1 and 4.2 could also solve Exercises 4.1 and 4.2 on page 133.

Example Exam Questions: students should be equipped by now with all necessary background material to solve Question 1 in the 2019 exam paper and Question 3 in the 2020 exam paper (Honour School of Mathematics Part B: Paper B5.1 & Honour School of Mathematics and Statistics Part B: Paper B5.1, Trinity Term 2019 and Trinity Term 2020).