Advanced Probability

MA 587/687-2E, Spring 2013

Chapter	587 and 687 students	687 students only	due date
1	1.3, 1.11		Jan 17
2	2.5, 2.17	2.10	Jan 17
3	3.10		Jan 22
4	4.5, 4.17 (bonus: 4.18)		Jan 22
5	5.1, 5.7, 5.12a	5.9	Jan 24
6	6.11		Jan 24
7	7.9, 7.11, 7.16		Jan 29
8	8.7		Jan 31
9	9.3, 9.11		Jan 31
10	10.3, 10.9		Jan 31
11	11.5, 11.6, 11.8		Jan 31
13	13.7	13.11	Feb. 7
16	16.6	16.11	Feb. 7
17	17.2		Feb. 7
18	18.6, 18.19		Feb. 14
19	19.9	19.14	Feb. 14
20	20.11, 20.17, 20.26, 20.34	8.11 (bonus)	Feb. 14
21	21.3, 21.5, 21.9		Feb. 14
22	22.11 (also: find k)		Feb. 14
23	23.11, 23.12, 23.13 (bonus)		Feb. 21
25	25.8, 25.13, 25.17		Feb. 21
26	26.11 (+ one on the last page)	26.14	Feb. 21
27	27.4, 27.16(a)	27.7, 27.9, 27.19	Feb. 28
29	29.9, 29.12, 29.14		Feb. 28
30	30.11, 30.13, 30.16		Feb. 28
31	31.5, 31.21	31.18	March 7
32	32.3, 32.11		March 7
33	33.9, 33.10, 33.15		March 7
35	35.6, 35.9, 35.15		March 28
36	36.11, 36.16, 36.27		March 28
37		37.19	March 28
38	38.11	38.28 (extra credit)	March 28
39	39.4		March 28
40	40.12, 40.14, 40.16		March 28

List of homework exercises from the electronic book for Actuaries

List of homework exercises from the electronic books on Markov Chains:

587 and 687 students: 20, 21, 23, 25, 27, 28, 36, 37 on page 17 in the introductory book

687 students only: 9, 10 from Section 11.2 (page 423) and 3, 4, 6, 9, 25, 26, 27, 28, 31(bonus) from Section 11.3 (pages 442–447) of the advanced book

Note: 587 students may do exercises 9, 10 from Section 11.2 (page 423) and 3, 4, 6, 9 from Section 11.3 (pages 442–447) of the advanced book for extra credit

List of homework exercises on multivariate normal distributions:

587 and 687 students: Exercise 5.6-1 on page 311 in the electronic notes. A bonus exercise in the class notes.

Assume that accidents on a 1000 miles long highway occur at a rate of one accident per 25 miles (on average). Justin is driving on this highway.

(a) Justin covers the first 50 miles and notices three accidents. What is the probability that in the next 50 miles, Justin will notice at least one accident? Give the formula for the probability that in the next 50 miles Justin will notice exactly k accidents.

(b) What is the distribution of the intervals between accidents? Write down a formula for the distribution function, give its mean value and variance. State clearly which unit of length you are using.

(c) Let X be the total number of accidents on the entire 1000 miles of the highway. What is the type of the random variable X? What is its parameter?

(d) Use normal approximation to compute $\mathbb{P}(35 < X < 44)$. Apply the histogram correction if necessary.

(Bonus) Let V be the number of accidents in the first 600 miles of the highway and W the number of accidents in the last 700 miles of the highway (see the sketch below). Note that these two intervals of the highway overlap. Compute Cov(V, W) and $\rho_{V,W}$.

