Subject CM1

Corrections to 2023 study material

1 Comment

This document contains details of any errors and ambiguities in the Subject CM1 study materials for the 2023 exams that have been brought to our attention. We will incorporate these changes in the study material each year. We are always happy to receive feedback from students, particularly details concerning any errors, contradictions or unclear statements in the courses. If you have any such comments on this course please email them to CM1@bpp.com.

This document was last updated on **3 April 2023**.

2 Paper A Course Notes

Chapter 4

Correction added on 15 December 2022

Page 12

In the opening paragraph of section 2.1 $i^{(2)}$ should be equal to 0.04939 rather than the currently stated 0.04949.

Chapter 20

Correction added on 19 December 2022

Page 17

The solution to the question at the bottom of page 16 should read:

The accumulated fund will be:

$$1,000,000 \times 1.04^{20} = 2,191,123$$

The expected number of survivors will be:

$$10,000 \times \frac{l_{60}}{l_{40}} = 10,000 \times \frac{9,287.2164}{9,856.2863} = 9,422.63$$

So the expected payout per survivor is:

$$\frac{2,191,123}{9,422.63} = £232.54$$

Chapter 24

Correction added on 3 April 2023

Page 21

The opening paragraph to Section 3.3 leads into the wrong equation. It should read:

We can use the Kolmogorov forward differential equations to derive transition probabilities, as in the case of multiple state models. We note from Section 2.1 that, in the multiple state model, this produces the following general result:

$$_t p_x^{\overline{ii}} = \exp\left(-\int_0^t \sum_{j \neq i} \mu_{x+s}^{ij} ds \right)$$

Page 26

The form of the deferred dependent probability is incorrect. It should read:

We can also use the table to calculate *deferred* dependent probabilities of the form:

$$_{n|}(aq)_x^k = \frac{(ad)_{x+n}^k}{(al)_x}$$

Page 27

A line of Core Reading contains the wrong notation. The corrected notation is below.

The notation used is $l_x^j, d_x^j, q_x^j, p_x^j, \mu_x^j$ *etc* for mode of decrement j.

Chapter 26

Correction added on 19 February 2023

Page 24

The table at the top of the page is incorrect as the expected claim expense has not been allowed for in the expected profit per policy in force at the start of the year.

The table should read:

Year	Premium	Expense	Interest	Expected claim expense	Expected death cost	Expected maturity cost	Expected profit per policy in force at start of year
1	2,000	–200	90.00	–5.00	-104.00		1,781.00
2	2,000	–30	98.50	–5.10	-216.40		1,847.00
3	2,000	–30	98.50	–5.20	-337.63		1,725.67
4	2,000	–30	98.50	–5.30	-468.13		1,595.07
5	2,000	–30	98.50	–100	-608.36	-11,723.35	-10,363.21

In the solution section there was also an error in the interest earned in year 5, which should be:

$$(2,000-30)\times 0.05=98.50$$

Hence the verification of the expected profit per policy in force at start of year 5 should be:

$$2,000-30+98.50-100-608.36-11,723.35=-10,363.21$$

3 Assignment X solutions

Solution 5.6

Correction added on 27 February 2023

The alternative solution presented for part (ii) contains a couple of errors. The limits on the integral should be 1 and 10 and the transition from the sick state to the dead state should be υ_{50+t}. Hence, the term and following explanation should read:

$$50,000\int_1^{10} e^{-\delta t} {}_{t-1}p_{50}^{ai} \, {}_1p_{50+t-1}^{\overline{ii}} \upsilon_{50+t} \, dt$$

This time the PDF is ${}_{t-1}p_{50}^{ai} \, {}_1p_{50+t-1}^{\overline{ii}}$*, that is at time t the life was sick one year ago, has remained sick for the last year and then has died from the sick state. This can be evaluated between the limits of 1 and 10.*