INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORTS

September 2019

Subject CM1B – Actuarial Mathematics

Introduction

The Examiners' Report is written by the Chief Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

Mike Hammer
Chair of the Board of Examiners
September 2019

A. General comments on the *aims of this subject and how it is marked*

1. CM1 provides a grounding in the principles of modelling as applied to actuarial work – focusing particularly on deterministic models which can be used to model and value known cashflows as well as those which are dependent on death, survival, or other uncertain risks.

2. The workbooks provided to candidates for each question give a suggested format for part or all of the solution and the methodology used in the model solutions follow these suggested formats. Candidates are not penalised for using a valid alternative approach. The workbooks are also designed so that the final numerical answers for some questions are to be shown on a specified 'Answers' sheet. Candidates are not penalised for not using these sheets if their final answers are clearly shown on their working sheets.

3. Candidates may lose marks where insufficient working is shown.

4. The exam is not designed to be a test of Excel skills. Thus, some functionality which may be preferred in a real-world work environment is not necessarily required to answer the questions. However, some good practices are useful to the student e.g. including variables/parameters the question states will change as inputs rather than hard coding these into formulae.

B. Comments on *student performance in this diet of the examination.*

1. The comments that follow the questions concentrate on areas where candidates could have improved their performance. Where no comment is made, the question was generally answered well by most candidates. The examiners look most closely at the performance of the candidates close to the pass mark and the comments therefore often relate to those candidates.

2. This was only the second sitting for a new large subject which was broadly a merging of the old CT1 and CT5 subjects. As in April, there appeared to be a large number of ill-prepared candidates who had underestimated the quantity of study required for the new larger subject and/or who had insufficient expertise in Excel to make a meaningful attempt at the CM1B paper with 18% of candidates scoring less than 20 on this paper. However, given this is a new subject and this paper involves a relatively new method of assessment, it is difficult to compare the performance of candidates in this diet with those in previous years.

3. The exam was designed to be slightly shorter than the April exam. However, this paper did not contain a simpler 'introduction' question as in April. This was one reason why the overall pass mark was set slightly lower.

C. Pass Mark

The Pass Mark for this exam in combination with CM1A was 55

Q1

The main challenge in part (i) was obtaining the relevant probabilities. Candidates who managed this, usually managed to calculate the values of the expected benefits.

Part (ii) was generally answered well with over half the candidates who made a meaningful attempt scoring full marks. A common error was to confuse the dependent and independent decrement rates.

In part (iii) many candidates failed to grasp what the question was asking them to do, that is, to combine the mortality from part (i) with the withdrawals from part (ii) to recalculate the present value of the benefit on death.
A common error was to use mortality/withdrawal rates for the wrong ages.

Part (iv) was poorly answered with less than a quarter of candidates scoring more than half marks. It is important to realise that analysing and commenting on results is a key required skill within this assessment.

Q2

More candidates seemed to make some attempt at this question as compared to Q1.

In part (i), common errors included
- assuming the income started at £500,000 per half-year rather than per year
- ignoring the fact that the income was received continuously.
- accumulating cashflows by an incorrect number of time periods.

Part (ii) was better answered than part (i), however a common error was to ignore the fact that income was received continuously which did over-simplify the calculations for this part and for part (iv).

Part (iii) was answered well by candidates who reached this stage but only the strongest candidates made much headway with part (iv).

@Institute and Faculty of Actuaries