EXAMINATION

21 April 2009 (pm)

Subject CA1 — Actuarial Risk Management

Paper Two

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes before the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have three hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Mark allocations are shown in brackets.*
5. *Attempt all seven questions, beginning your answer to each question on a separate sheet.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.

In addition to this paper you should have available the 2002 edition of the Formulae and Tables and your own electronic calculator from the approved list.

1 A futures exchange guarantees contracts between parties that participate in the exchange.

Describe how the exchange manages its credit risk exposure. [6]

2 An individual intends to take out a 25-year mortgage of £60,000 to finance the purchase of a new home. The individual is considering the following policies:

(a) Income protection policy: The policy will provide an income of 60% of gross earnings in the event that the insured is unable to work due to illness or accidental injury. The income commences three months after the event.

(b) A regular premium 25-year unit-linked endowment assurance with a sum assured of £60,000 payable in the event of critical illness or death.

(c) A regular premium 25-year term assurance with a sum assured of £60,000 on death together with a waiver of premium on ill health.

Discuss the risks avoided by the individual with each of the insurance policies. [7]

3 An actuary has been asked to carry out a small, one-off investigation for a client, which will require the use of a model.

Discuss the factors the actuary should take into account when considering how to approach the development of this model and choosing the source of the model. [8]

4 An individual, whose motor insurance policy is due for renewal, uses a website to compare quotes from a range of providers including his current insurer.

The individual supplies personal and other details and specifies the type of cover required. Based on this information, the website gives a wide range of premiums, all of which are lower than the premium currently being paid.

Explain possible reasons for the range and size of the results of this comparison exercise. [11]

5 In twelve months' time, a country is due to hold an election to choose its government. There are likely to be five parties contesting the election. A respected polling organisation currently estimates the probability of each party winning the election to be:

Party	A	B	C	D	E
Probability %	40	30	15	10	5

A company wishes to use this data to construct an investment product linked to the result of the election.

In return for a single premium, investors will be able to select the party that they think will win. If their selection does win, they will receive a fixed multiple of their original investment. If their selection does not win, the investment is lost. The multiples offered vary between each party and for each party they will vary over time depending on the relative probabilities of victory at each point in time.

The multiples can be non-integral, for example 4.333 or 2.375 per unit invested

Twelve-month money market interest rates are currently 5%.

(i) Calculate, stating the assumptions you use, the multiples that the company should currently offer in respect of each party winning the election. [6]

(ii) Discuss the issues relating to the determination of the election result that will need to be clarified when drawing up the terms of the contracts. [3]

Six months later, two of the parties withdraw from the election.

(iii) State the actions the company could take in respect of investments already made on each of the original five parties. [2]

A rival company offers the following terms on the three remaining parties:

Party	X	Y	Z
Multiple	4.0	2.5	3.5

(iv) Explain why these terms could cause problems for this rival company. [2]

Many companies offer similar products using the results of a range of events as the underlying investment on which contracts are based. Primarily, these products involve predicting the outcomes of individual or an accumulation of sporting contests. Most results are known and winning payouts made on the day, or within a few days, of the investment being made.

(v) Explain how the concept of reinsurance could be used to manage the risk inherent in these products. [6]

[Total 19]

6 An insurance company is designing a life insurance product where cheaper rates are offered to customers who are considered to have a relatively low mortality risk compared with the general population.

(i) Discuss the rating factors to apply when pricing this new product. [10]

(ii) Outline the design features of this product that could be incorporated to make the product more marketable. [3]

(iii) Describe the factors from the external environment to consider when designing this new product. [9]
[Total 22]

7 Company X is a subsidiary of a large multinational group, Group Y. Group Y has an extensive range of businesses in the country in which X operates. X is going to be demerged from Y, and the demerger agreement requires X to set up pension arrangements for its employees, which should be broadly similar to the defined benefit pension scheme operated by Y. X has very little in-house resource or expertise for pension operations.

(i) (a) List the main parties (other than Group Y) including professional advisors, that will be involved in establishing Company X's new pension arrangements.

(b) Explain the role of each of the parties in (a). [5]

(ii) Discuss how the actuarial control cycle could be used in relation to the benefit design for the new pension scheme. [12]

Two years after the scheme was established, an actuarial investigation is being carried out into the funding position of the scheme, and the surplus/deficit is being calculated.

(iii) Outline the data that is needed for this investigation. [6]

(iv) Outline the checks that would be performed on the data. [4]
[Total 27]

END OF PAPER