EXAMINATION

23 April 2009 (pm)

Subject ST3 — General Insurance Specialist Technical

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 six 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 List regulatory restrictions that could be applied to a general insurance market, briefly explaining the reason for each. [12]

2 A general insurance company selling personal lines insurance policies is considering removing the excess from future policies and replacing it with a deductible of the same magnitude.

(i) Explain the terms "excess" and "deductible", highlighting the main difference between them, and giving an example to support your answer. [4]

(ii) Discuss the effects that this change could have on the company's future operations and profits. [4]

(iii) Describe how the company should model the potential impact of this change on profit. [4]

[Total 12]

3 The following data are provided for a general insurance class of business:

- paid claim amounts by accident year and development period
- incurred claim amounts by accident year and development period
- settled claim numbers by accident year and development period
- reported claim numbers by accident year and development period
- ultimate premium data by accident year

(i) Give examples of the checks that you would carry out during a reserving exercise, explaining what each of these would show. [5]

(ii) Suggest, with examples, reasons why the actual run-off of outstanding claims may at times be higher than the estimated amounts when monitoring the claims reserve figures for mortgage indemnity business. [7]

(iii) List other reasons why a general insurance company would analyse claims data. [4]

[Total 16]

4 A general insurance company arranges a layer of excess of loss reinsurance for £4.0m excess of £1.0m for individual claims. There is also an annual aggregate deductible of £4.0m.

The reinsurer charges an initial premium of £1.0m with a first reinstatement premium of 120% of initial premium, a second reinstatement premium of 150% of initial premium, and no further reinstatements.

The actual claims in the year are shown below in the order that they occurred:

Claim	*Claim size*
1	£2.5m
2	£3.5m
3	£6.0m
4	£4.2m
5	£1.8m
6	£3.0m
7	£5.0m

(i) Calculate the claim amounts paid by the reinsurer and the reinstatement premiums payable after each claim. [6]

(ii) Define aggregate excess of loss reinsurance. [1]

(iii) Explain how stop loss reinsurance is different from aggregate excess of loss reinsurance. [3]

(iv) Explain why stop loss cover is generally quoted in terms of claim ratios rather than monetary amounts. [1]

(v) Suggest possible risks relating to the direct writer's operations that a reinsurer would face if stop loss cover were made available. [3]

(vi) Describe the conditions that a reinsurer providing stop loss cover is likely to impose on the business covered. [1]

[Total 15]

5 An individual claim amounts distribution, $F(x)$, is a discrete distribution on the positive integers, and the number of claims, N, has a binomial, Poisson or negative binomial distribution. The probability functions for individual claim amounts (X_i) and aggregate claim amounts (S), respectively, are:

$$f_k = P(X_i = k) \quad k = 1, 2, 3, \ldots.$$
$$g_k = P(S = k) \quad k = 0, 1, 2, \ldots.$$

Constants a and b are such that the distribution of N, $P(N = r) = p_r$ satisfies the following equation:

$$p_r = (a + b/r)\, p_{r-1} \text{ for } r = 1, 2, 3, \ldots$$

and

$$E\left[X_1 \left| \sum_{i=1}^{n} X_i = r \right. \right] = r / n$$
$$E\left[X_1 \left| \sum_{i=1}^{m} X_i = r \right. \right] = \sum_{j=1}^{r} j f_j \cdot f_{r-j}^{(n-1)*} / f_r^{n*}$$
$$p_n f_r^{n*} = \sum_{j=1}^{r-1} (a + bj/r)\, f_j\, p_{n-1}\, f_{r-j}^{(n-1)*}$$

(i) Derive a recursion formula for the aggregate claim distribution $G(x)$. [6]

The number of claims follows a Poisson distribution with mean 125. The claims are assumed to be random variables, independent of each other and independent of N, with a Pareto distribution with mean £750 and standard deviation £1,750.

The PDF for the Pareto distribution is:

$$f(x) = \frac{\alpha \lambda^{\alpha}}{(\lambda + x)^{\alpha+1}} \quad x > 0$$

(ii) Show that $E[S]$ = £82,523, given that $S = X_1 + X_2 + X_3 + \ldots + X_N$, if a policy excess of £100 is introduced. [6]

(iii) Calculate suitable values for the parameters of a translated gamma distribution to approximate the distribution of S given that the standard deviation is £23,480 and coefficient of skewness of S is 0.6838. [3]

[Total 15]

6 A country has experienced a significant increase in insurance premium rates in recent years. The regulators believe that the major factors contributing to this are a significant increase in the level of bodily injury court awards as well as the proportion of claims cost spent on legal expenses. Although solicitors only charge a fee if the case is successful, fees can account for up to 40% of damages awarded.

As a result, the regulators are planning to introduce a Bodily Injuries Compensation Authority (BICA), with the principal aim of reducing premium rates, which will operate as follows:

- Disputed bodily injury claims less than two years old will automatically be referred to the BICA before they are allowed to be processed through the court system.
- Any disputed bodily injury claims not notified within two years of injury will be referred to the court system.
- The claimant will be charged a small fixed fee, regardless of the outcome of the claim.
- General insurance companies will be charged a fee in proportion to their market share based on total GWPI to cover the additional running expenses of the BICA.
- The initial application will be made by post on a standard form completed by the claimant's doctor.
- The claimant will not meet the BICA staff in person and therefore legal representation will not be possible.
- Damages awarded by the BICA will be based on standard amounts by type of injury. A single amount will cover pain and suffering, medical expenses and loss of earnings.
- Any associated property damage claims will not be processed by the BICA.
- The claimant will be notified of the damages awarded by post.
- The BICA will aim to settle claims within 90 days of notification.
- If the claimants are dissatisfied with the level of compensation, they may reject the award and continue with the claim through the court system.

(i) Discuss the advantages and disadvantages to the claimant of this system of claims resolution. [7]

(ii) Describe the adjustments that a private motor pricing actuary would need to make to the existing premium calculation assumptions and methodology as a result of the introduction of the BICA. [13]

(iii) Suggest improvements that could be made to the proposed system, giving reasons for these. [10]

[Total 30]

END OF PAPER