INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

26 April 2023 (am)

Subject SP8 – General Insurance Pricing Specialist Principles

Time allowed: Three hours and twenty minutes

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

If you encounter any issues during the examination please contact the Assessment Team on T. 0044 (0) 1865 268 873.

© Institute and Faculty of Actuaries

1 (i) Define what it means for a contract to be swing rated. [1]

(ii) Describe the two forms of swing rate. [2]

[Total 3]

2 For a particular class of business, two formulae are used to calculate the credibility factor:

- Formula A is based on the method of partial credibility, with 1600 expected claims needed for full credibility.
- Formula B is based on the Bühlmann–Straub method, with $\frac{\phi}{\lambda}$ of 391.

One claim is expected during each year.

Determine the maximum number of years for which Formula B yields a larger credibility factor than Formula A. [6]

3 (i) Explain why it is important for a general insurance company to understand the mix of business it writes. [5]

An Underwriter in a general insurance company that writes private motor insurance has developed an approach for measuring the mix of business. Car brands have been categorised into three groups, and each group has been given a score:

- Luxury – score of 3
- Standard – score of 2
- Basic – score of 1.

Mix of business is calculated as the sum of the scores for the active motor policies at the time.

(ii) Comment on this measure of mix of business. [3]

[Total 8]

4 In a well-established personal lines motor insurance market, some insurers offer No Claims Discount (NCD) with their products, while others do not. For those that do, the NCD structure varies between insurers.

(i) Discuss the implications of the inconsistent use of NCD in the market. [4]

The Regulator of the general insurance market has stated that it will introduce and operate a standard NCD scheme. The Regulator will capture all claim information and will set the level of discounts that each insurance company must comply with. The system will also be linked with police records of motoring convictions to define the level of NCD.

(ii) Outline the Regulator's motivations for this initiative. [2]

A Pricing Actuary works for an insurance company that does not currently use NCD.

(iii) Describe the actions the Pricing Actuary is likely to carry out to allow for this new regulation. [4]

[Total 10]

5 (i) Define the cover provided by marine cargo insurance. [2]

(ii) Outline how experience rating may be used to calculate the risk premium for a cargo insurance policy. [6]

(iii) Outline how exposure rating may be used to calculate the risk premium for a cargo insurance policy. [4]

[Total 12]

6 A general insurance company writing personal lines business in a well-established market collects and makes use of a lot of data.

(i) State why it is important that the data is accurate. [5]

(ii) Describe checks and controls the insurance company could have to improve the accuracy of the data. [4]

The data may be used as an explanatory factor in a generalised linear model. Part of the modelling exercise involves parameter smoothing.

(iii) Describe different methods of parameter smoothing. [3]

[Total 12]

7 A recent market report states that reinsurance premiums have been hardening over the past couple of years.

(i) Describe how the pricing assumptions for an excess of loss contract could change in such an environment. [4]

A Reinsurance Actuary has received the following data from the cedant:

Sum insured lower limit ($m)	*Sum insured upper limit ($m)*	*Original premium ($m)*	*Expected loss ratio (%)*
0	10	450	65
10	20	300	65
20	30	250	65
30	40	150	65
40	60	90	65
60	100	70	65

The Actuary considers the following exposure curve available for pricing:

Loss severity (%)	*Exposure curve (%)*
30	60
40	75
50	85
60	90
70	94
80	97
90	99

(ii) Calculate the expected loss cost to a treaty covering losses in excess of $25m with a limit of $15m. [6]

(iii) Discuss some concerns the Actuary may have about the cedant's data. [5]

[Total 15]

8 A reinsurance company uses a frequency-severity model to price a property quota share contract using the following simplified loss ratio distribution:

Loss ratio (%)	*Probability (%)*
50	5
52	10
54	20
56	30
60	20
65	10
70	3
75	2

The commission follows the structure below:

Ceded loss ratio (%)	*Reinsurance commission (%)*
≤ 55	35
56	34
57	33
58	32
59	31
60	30
61	29
62	28
63	27
64	26
≥ 65	25

The expense loading is 7% of ceded premium.

(i) Calculate the average profit margin for the contract. [3]

(ii) Comment on the reinsurer's profit margin distribution. [3]

(iii) Outline the advantages of using frequency-severity over the burning cost method to price this contract. [5]

(iv) Explain how the reinsurance company could choose between different proprietary models to price the catastrophe load for this contract. [5]

[Total 16]

9 (i) Discuss the advantages and disadvantages of insurance contracts with 3-year durations from the point of view of a general insurance company and its policyholders. [8]

(ii) List reasons why risks related to climate change may not be insurable. [3]

A general insurance company sells a range of products with annual policies. Its Student Actuary says 'there is no need to include climate change related risks in the pricing models, because the price can be adjusted annually if the risk changes'.

(iii) Comment on the Student Actuary's statement. [2]

(iv) Describe elements of the pricing process that could be influenced by climate change. [5]

[Total 18]

END OF PAPER