

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINATION

11 September 2023 (am)

Subject SP8 – General Insurance Pricing Specialist Principles

Time allowed: Three hours and twenty minutes

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

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

1 Explain, in your own words, the differences between supervised and unsupervised learning, in the context of building a predictive model. [5]

2 (i) Outline how a general insurance company may allow for profit loading using a target return on capital. [4]

A general insurance company uses an algorithm, based on market conditions, to optimise the motor renewal premium charged to customers. The algorithm is designed to maximise total profit, subject to each optimised renewal premium deviating by no more than 5% of the corresponding theoretical office premium.

(ii) Outline factors that should be considered while constructing the algorithm. [5]

[Total 9]

3 (i) State the qualities of a good rating factor. [3]

A general insurance company that writes a variety of lines of business has been approached by a third party offering data that could be useful as new rating factors.

(ii) Outline the analyses the pricing actuary could undertake to evaluate the potential new factors. [3]

(iii) Suggest considerations that would have to be taken into account before using the factors if the analyses showed they were predictive. [4]

[Total 10]

4 A student actuary has obtained a dataset of fire losses from commercial property policies in a particular country. They want to fit a statistical distribution to the claim severity.

(i) Outline the factors to consider in selecting the statistical distribution. [4]

(ii) Outline, with examples, two different approaches that the student could use to check the fit of the distribution. [4]

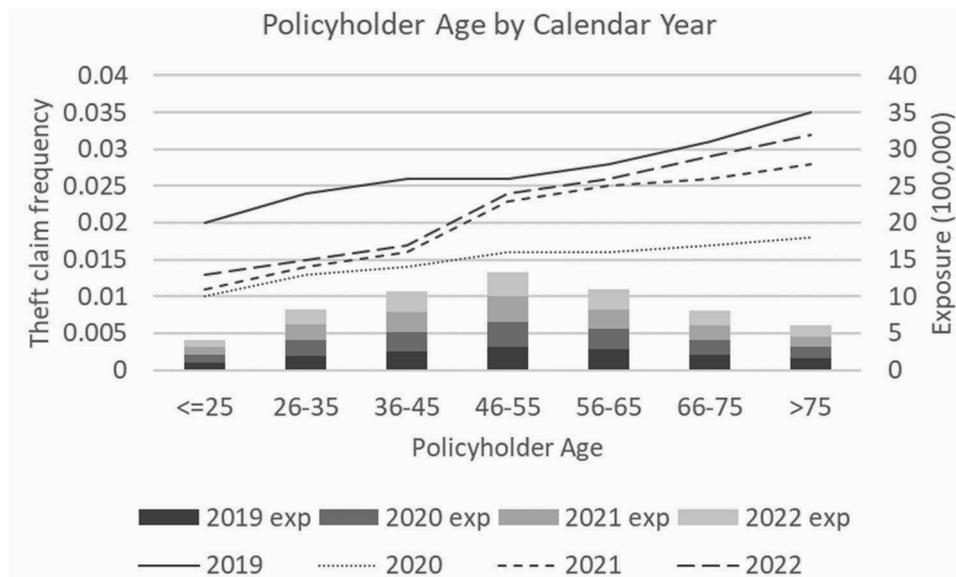
(iii) Write down sources of uncertainty in estimating the parameter(s) of the statistical distribution. [3]

[Total 11]

5 It is recommended when fitting a Generalised Linear Model (GLM) to analyse the interaction of each factor with calendar year.

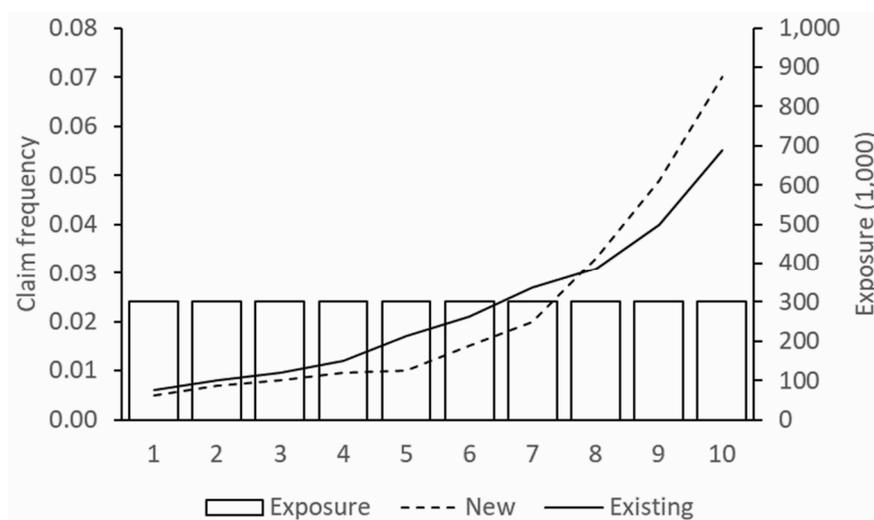
- (i) Define, in your own words, what is meant by ‘interaction’ in the context of a GLM. [2]
- (ii) Explain why it is recommended to analyse the interaction of each factor with calendar year. [3]

An actuary working in the rating department has built a new GLM to model the frequency of theft in home contents insurance policies. The actuary has interacted the factor ‘age of policyholder’ with calendar year and produced the plot below:



- (iii) Comment on the interaction shown in the plot above. [3]

The actuary has produced lift curves to assess the performance of their new GLM against the existing model, shown below:



- (iv) Outline the likely steps that the actuary would have taken to produce such a plot. [3]
- [Total 11]

6 A general insurance company insures a medium-sized portfolio of construction projects.

Discuss the advantages and disadvantages of each of the following reinsurance programmes for this insurance company:

- Quota share
- Surplus reinsurance
- Risk excess of loss
- Stop loss.

[12]

7 Company P, a large energy company, wishes to insure against property damage to its various power plants located in Country X.

(i) State the benefits and perils likely to be covered by such a policy. [5]

(ii) List the rating factors that may be used to determine the premium for the policy. [4]

Owing to the measures taken to limit climate change, some insurance companies in Country X are not willing to insure Company P's coal plants, and there is insufficient capacity in the rest of the insurance market in Country X.

(iii) Explain how setting up a captive may help Company P obtain adequate insurance cover for its coal plants. [4]

[Total 13]

8 An actuarial analyst has stated that an excess of loss reinsurance policy with multiple reinstatements will always have a lower initial premium than a similar reinsurance policy with only one reinstatement.

(i) Comment on the actuarial analyst's statement. [3]

A reinsurance company has designed a new product called Reinstatement Premium Protection (RPP) cover. This covers the cedant's reinstatement premium in the event of a loss under a specified excess of loss policy.

(ii) State the factors that a cedant would consider before buying the RPP cover. [6]

(iii) Outline the approach that the reinsurance company may take to price this cover using the frequency-severity method. [5]

[Total 14]

9 A general insurance company has recently implemented a marketing campaign to grow its portfolio.

- (i) Discuss the different metrics that could be used to monitor the impact of the campaign. [8]

A marketing manager has stated that a larger portfolio will always mean higher profit margins due to economies of scale.

- (ii) Explain why this statement may not always be true. [7]
[Total 15]

END OF PAPER