

EXAMINATION

31 May 2024 (am)

Subject F103 — General Insurance Fellowship Principles

Time allowed: Three hours and twenty minutes (which includes five minutes for downloading and uploading your answer document)

Total marks: 100

INSTRUCTIONS TO THE CANDIDATE

1. Ensure that you are logged in and authenticated through Examity before you attempt the examination.
2. The question paper is only available in the ASSA Exam Platform as a PDF download and may not be printed. Copy/paste of questions or parts thereof is allowed from the question paper to your Word answer document only.
3. Download the Word answer document template from the ASSA Exam Platform. Save this Word answer document on your desktop using your Candidate Number as filename. You are required to submit your answers in Word format ONLY using this document. No answers in any other format (e.g. handwritten) will be accepted. Save work regularly.
4. Ensure that your Candidate Number appears in the “header” of your Word answer document. [Double-click on the header at the top of the Word document, input your Candidate Number only in the header, then press “Esc” to close the header.] **Do not use your name or member number anywhere in your Word answer document.**
5. You may not access any file from your computer, use any other computer app (e.g., Email or Excel) or open any other browser during the examination. Nor may you use Grammarly, Grammarly Premium or similar add-ins. Microsoft Word spellcheck is allowed.
6. You may not use any other material (e.g., a Formulae and Tables book) during the examination. Any such information that may be required will be provided to you within the examination.
7. You are strongly encouraged to use the first 15 minutes as reading time only, however, you may start answering the paper whenever you are ready.
8. Mark allocations are shown in brackets.
9. Attempt all eight (8) questions, starting each on a new page (as provided for in the Word answer document).
10. Show calculations where appropriate. You may use blank paper to carry out rough work calculations. You may use a calculator from the ASSA-approved list only.
11. Upload your Word answer document only into the ASSA Exam Platform. Once you have uploaded your document, you must click on **Finish Attempt** to save your document. You will still be allowed to go back and make changes (**Review Attempt**) if you have time.
12. Once you are satisfied with your uploaded document, click **Finish Attempt** and **Finish all and Submit**. Once you have submitted you will not be able to make any changes.
13. **You must submit your Word answer document BEFORE the end of the allotted examination time.** You should stop writing and start uploading during the last five minutes. Take this into account when planning your review and submission. There will be no time announcements.

Note: The Actuarial Society of South Africa will not be held responsible for loss of data where candidates have not followed instructions as set out above.

END OF INSTRUCTIONS

QUESTION 1

- i. Outline 6 reasons why a well-established general insurer with relatively large free reserves and no solvency concerns, operating in the domestic market only, may wish to seek reinsurance.

[6]

XYZ is an insurance company which specialises in a particular type of insurance. It has set up reinsurance arrangements which operate in the order given below:

- Surplus, with a maximum of 3 lines of cover.
- Risk Excess of Loss, as follows:
 - Cover: R100m XS R40m for a period of one year.
 - Initial Premium: R20m
 - One reinstatement, at a rate of 150% of the original premium, is permitted. Reinstatements operate on the basis of being pro-rata as to amount and time.

XYZ suffered the following losses during the year:

Loss	Loss Amount	No. of Surplus lines used	Duration into treaty
1	R240m	2	4 months
2	R300m	1	7 months
3	R600m	3	10 months

- ii. For each of the losses determine:

- a. The reinsurance recovery; and
- b. The reinstatement premium to be paid at that time.

[6]

[Total 12]

QUESTION 2

- i. Outline reasons for a general insurer needing to know the split of its claim costs between indemnity payments and expenses.

[2]

A medium-sized general insurer is experiencing strong growth in its motor and property insurance business. The insurer makes extensive use of proportional and non-proportional reinsurance for these lines, and it is now reviewing its reinsurance arrangements.

- ii. Outline briefly the various aspects of reinsurance that could be investigated as part of the review.

[7]

- iii. Outline briefly the consequences for the insurer of not carrying out appropriate reinsurance investigations.

[3]

[Total 12]

PLEASE TURN OVER

QUESTION 3

- i. Define the term “captive insurer” and state the main reason why a company may establish one. [1]

You work at Worldwide Insurance Group (WIG), a multinational insurer with various subsidiaries across different geographical territories that specialise in property insurance products. WIG is considering establishing a captive insurer to accept climate-related risks from insurers within the group.

- ii. Outline briefly 6 reasons why WIG may be looking to set up a captive as opposed to using other methods for managing climate-related risk. [3]
- iii. Comment on potential alternatives to setting up a captive insurer for transferring climate-related risks. [6]

[Total 10]

QUESTION 4

- i. Define “operational risk”. [2]

You work for an insurer that recently implemented models that have resulted in some significantly improved key metrics. These models include:

- A. A sales model that uses a neural network to rank potential policyholders in order of how likely they are to buy insurance. The model is linked to a robotic call centre that then contacts the top 10% of people that are most likely to purchase cover. Since its implementation the insurer has increased new business 20% year-on-year.
- B. A fraud detection model that uses machine learning to identify fake claim images and suspicious claims. Over the past year, the model has improved in accuracy to a level better than the employees whose data the model was trained from.

- ii. Discuss 3 potential risks that may arise from using these two models. [3]

The country the insurer operates in has recently signed a new law prohibiting insurers using any automated artificial systems which operate as a “black box” (i.e. that the insurer cannot fully explain its workings to the regulator).

The insurer is concerned as both of its models above will now have to be decommissioned.

- iii. Outline 3 alternative distribution methods using human staff that the insurer could adopt, rather than the automated approach in A above. [3]
- iv. Outline 3 types of insurer expenses that are likely to be most impacted by the introduction of the new law. [3]

[Total 11]

PLEASE TURN OVER

QUESTION 5

- i. Define what is meant by “group risk”.

[1]

Act Insurance Group (AIG) is a multinational insurance group which operates several subsidiaries across different geographical regions, each offering different niche liability insurance products. Most of the subsidiaries historically functioned autonomously from the parent company. However, recent strategic shifts at the group have now resulted in capital modelling being done for the entire group at head office, with the total capital requirement being split and allocated to the subsidiaries in such a way that there should be no significant increases to the year-on-year capital requirements for any subsidiary.

- ii. Identify and explain 5 potential risk types that may arise for subsidiary insurers in having the capital modelling function moved to head office.

[5]

- iii. Define the Shapley and proportions methods that could be used in determining the best approach for allocating the capital required by each subsidiary.

[2]

- iv. State, with justification, which of the methods in (iii) would be more appropriate for AIG.

[4]

[Total 12]

QUESTION 6

- i. Outline the benefits provided by product liability insurance, listing four perils that might be insured against.

[3]

All-Re provides non-proportional reinsurance to direct insurers specialising in product liability sold to pharmaceutical manufacturers. Direct writers issue policies on a losses-occurring basis, and All-Re policies are also written on a losses-occurring basis.

- ii. Outline All-Re’s liabilities and hence discuss suitable assets for All-Re.

[5]

- iii. Explain briefly how your answer in (ii) might differ if All-Re’s policies are sold on a claims-made basis rather than losses-occurring basis.

[2]

All-Re prepares its accounts using Funded (or Underwriting Year) accounting.

- iv. Explain the adjustments needed to convert Underwriting Year accounts to Accident Year.

[2]

An actuarial student investigating potential distorting effects in insurer reported accounts claims that the use of prudent outstanding claims reserves leads to insurance profit being lower than realistic profitability.

- v. Comment on the student’s claim.

[3]

[Total 15]

PLEASE TURN OVER

QUESTION 7

- i. Describe the burning cost approach for calculating risk premiums and explain the difference between the effective burning cost and indexed burning cost.

[3]

You are a pricing actuary working for an established reinsurer specialising in commercial property insurance and business interruption cover. You have been provided with the following extract of written premiums and an estimate of ultimate claims from the reserving team.

Underwriting Year	Sums Insured (R millions)	Written Premium (R millions)	Ultimate Cost (R millions)	Loss Ratio	Burning Cost Premium (R per R1000 SI)
2015	44 336.1	300.5	229.4	76%	
2016	46 549.2	315.5	234.6	74%	
2017	48 880.3	331.3	240.5	73%	
2018	44 012.2	200.5	176.5	88%	
2019	47 304.9	215.5	198.0	92%	
2020	50 861.0	231.7	216.5	93%	
2021	54 680.5	249.1	424.2	170%	
2022	58 785.4	267.8	841.0	314%	
2023	55 843.9	254.4	219.0	86%	
Total	451 253.4	2 366.3	2 779.7	117%	
2015 - 2017	139 765.6	947.3	704.5		5.0
2018 - 2020	142 178.0	647.7	591.0		4.2
2021 - 2023	169 309.8	771.3	1 484.2		8.8
2019 - 2023	267 475.6	1 218.5	1 898.7		7.1

- ii. Calculate the burning cost premium (per R1000 sum insured) for 2015-2023.

[1]

The reserving team has expressed concern that the current premium rates are insufficient given that the book is running at a loss ratio over 150% over the last 5 years.

- iii. Discuss briefly the factors you would consider in addressing the concerns of the reserving team based on the data they provided and outline any additional analysis you would carry out before re-pricing the book.

[8]

[Total 12]

QUESTION 8

Your company is a relatively new niche insurer writing various forms of commercial liability insurance. It started writing public liability insurance 4 years ago.

- i. Outline 4 distinct sources of uncertainty that could affect your company's future public liability claims experience.

[4]

PLEASE TURN OVER

- ii. State 2 reasons why a stochastic reserving model may produce unreasonable results for quantifying parameter error and process error.

[2]

You have decided to estimate the uncertainty in the claims reserves by using a range of alternative assumptions to recalculate the claims reserve producing a range of possible claims reserves.

- iii. Outline 2 advantages and 2 disadvantages of using alternative assumptions to estimate the uncertainty in the claims reserve.

[4]

You have been provided with the following best estimate claims payment pattern for public liability claims for reserving purposes, which was derived from market statistics given the limited internal data available from the company:

Proportion of claim payments made in development year:				
1	2	3	4	after 4 years
15.0%	30.0%	25.0%	20.0%	10.0%

The best estimate claims reserving basis for public liability business is given below:

- Most recent year (2023): Loss Ratio method assuming a 50% loss ratio.
- All prior years (2021-2022): Basic Chain Ladder method using paid claims triangles.

You have been provided with the following additional information for the public liability business, including cumulative claims paid to the end of 2023 associated with each year's earned premiums:

Accident year	Earned Premium (R millions)	Cumulative claims paid (R millions)
2021	400	150
2022	500	100
2023	600	200

- iv. Calculate the claims reserve, as at 31 December 2023, based on the information provided above, assuming:

- The loss ratio to be used for 2023 accident year is based on a claims frequency that is 10% higher than the best estimate assumption.
- All claims are paid 3 months later than the best estimate assumption. This requires you to recalculate the proportion of claim payments estimated for each future development year given above, stating any assumption(s) you make.

[6]

[Total 16]

END OF PAPER