

EXAMINATION

6 November 2015 (am)

Subject F101 — *Health & Care* Fellowship Principles

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. Use the instructions and password provided at the examination center to log in.
2. Submit your answers in Word format only using the template provided. You **MAY NOT** use any other computer program (e.g. Excel) during the examination.
3. Save your work regularly throughout the examination on the supplied computer's hard drive.
4. You have 15 minutes at 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.
5. You must not start typing your answers until instructed to do so by the supervisor.
6. Mark allocations are shown in brackets on exam papers.
7. Attempt all nine (9) questions, beginning your answer to each question on a new page.
8. Candidates should show calculations where this is appropriate.

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.

AT THE END OF THE EXAMINATION

Save your answers on the hard drive AND hand in this question paper.

<p><i>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.</i></p>
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QUESTION 1

Explain why stochastic modelling might be useful for healthcare insurance purposes and state any disadvantages that stochastic modelling may have compared to the use of deterministic models.

[5 marks]

QUESTION 2

A student in the analytics team at a large health insurer is carrying out an analysis of experience on the previous year's hospital claims using a generalised linear model (GLM). The student has developed two potential models. The two models are identical except for the second model having both income band and geographic location as additional factors.

- (i) List two properties of the exponential family of distributions which make them particularly useful when using a GLM. [1]
- (ii) Explain which two tests can be used to analyse the significance of the additional factors in the second model. [2]
- (iii) List two other checks that should be carried out before including additional factors into a model. [1]

[4 marks]

QUESTION 3

A health insurance company sells single premium prefunded unit linked Long Term Care Insurance (LTCI). A recent market analysis has indicated likely poor investment return in local and overseas equity and property markets is to be expected over the medium term.

- (i) Define "Fund protection" and outline three different levels of fund protection that can be offered on a unit linked LTCI contract. [2]
- (ii) Discuss the potential impact of poor investment return on the company and existing policyholders. [8]

[10 marks]

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QUESTION 4

You work as an actuary for Violet Health, a health insurance company. Your cousins, Louise, Sandy and Rose have recently completed their university studies and have started work there too. Violet Health offers the following two plans to their employees for the same premium:

- Plan A: Comprehensive medical expense cover with a R30 000 deductible on hospital related claims. Out of hospital claims are covered at 80% through a medical savings account. The annual contribution to the medical savings account is R15 000.
- Plan B: A PPO with a R10 000 deductible on in hospital claims.

Louise, Sandy and Rose have asked for your advice regarding which plan to enroll on since they know that you helped to design these plans and you have asked them for a brief health history.

- Louise is a triathlete with no health problems other than the occasional sprain.
- Sandy has asthma and type 1 diabetes and has averaged around R35 000 in non-preventative medical expenses over the last few years. She enjoys playing hockey recreationally.
- Rose hasn't been to a doctor in four years. She smokes at least a pack of cigarettes a day and doesn't really know much about her current state of health.

Recommend the plan each of your cousins should enroll on based on the information above and justify your answer.

[6 marks]

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QUESTION 5

The government of Healthnation provides healthcare for the whole population via the public sector. The private insurance system provides for access to private service providers and facilities which provide quicker treatment times and more luxurious accommodation. The private sector is regulated by requiring open enrolment, community rating and a comprehensive set of minimum benefits.

The regulator is looking at allowing private sector insurers to provide benefit plans without minimum benefits, concurrently to the existing benefit plans.

- (i) Describe the objectives of an insurance regulator [2]
- (ii) Outline why the regulator would remove minimum benefits [4]
- (iii) Discuss the impact on stakeholders of this change in the environment [6]

[12 marks]

QUESTION 6

The dominant private hospital group in Actuarialia, with hospitals all over the country, has recently hired a health actuary as its new CEO. The health insurance market is dominated by individual PMI cover which is predominantly taken out by older policyholders or families while younger members tend to go uncovered and rely on state healthcare due to the cost of PMI. He believes that there is an opportunity to contract directly with employer groups and offer full cover for all expenses related to a basket of in-hospital procedures for their employees. The employer will pay a fixed contribution for each employee that is covered under the agreement. Contribution rates will vary by the main industry of the employer only.

- (i) Outline the issues that the hospital group needs to consider when designing this specific product. [8]
- (ii) Explain how you would calculate the contribution rate per employee covered. [9]

[17 marks]

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QUESTION 7

The Reddington province of the country of Actuarial has the highest per capita income. The national insurance plan pays for outpatient hospital and specialist services on a fee for service (FFS) basis and pays on a per diem basis for in hospital claims. The benefits of the plan are as follows:

Inpatient hospital	Home nursing and midwife
Outpatient hospital	Emergency transportation
Specialists	Optometry
Screening	Adult dentistry
General practitioners	Basic radiology and pathology
Prosthetic devices	Family planning

The average GP visit utilisation is 2 310 visits per 1 000 beneficiaries at an average cost of R350 per visit.

- (i) Budget constraints mean that Reddington must trim the cost of the national insurance plan for 2015. Identify approaches to reduce claim costs and a specific action in each case. [4]
- (ii) It has been proposed that GP visits are reimbursed on a scale according to the complexity of the case. It is estimated that the complexity of the cases are distributed per the following table. The proposed reimbursement scale is also set out in the table.

Type	% of visits	Fee
High	15%	R500
Medium	30%	R300
Low	55%	R200

- (a) Describe the risks to the national insurance plan and to the GPs of moving to the proposed fee structure. [4]
- (b) Suggest risk mitigation strategies for the risks identified in (a) above. [3]
- (c) Calculate the effect of the percentage of visits with high complexity increasing to 20% with a proportional reduction in the Medium and Low visits and comment on the results. [4]

[15 marks]

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QUESTION 8

A health insurer is preparing financial forecasts on the following basis for the next 3 years (2015-2017):

- Net premium income of R108m in each year;
- 40% tax rate on earnings with no tax credit for operating losses;
- Key ratios:

% of premium	2015	2016	2017
Projected claims loss ratio	88%	86%	85%
Operating expenses	15%	12%	11%

- (i) Describe 3 ways to cope with uncertainty in financial forecasts [2]
- (ii) Prepare a projection of the income statement for the health insurer [5]
- (iii) Comment on the trend in net earnings and what initiatives the health insurer is likely to be adopting to achieve this. [5]

[12 marks]

QUESTION 9

A small private health insurer is setting up a hospital network for an existing low cost product. Members of the low-cost product will be required to visit a network hospital for treatment, other than emergency cases. The aim of the network is to help contain hospital costs. Hospitals are being selected to be part of the network based on their overall cost efficiency scores, as measured by the insurer. You have recommended that the efficiency calculations are done on a risk adjusted basis.

- (i) Discuss why risk adjusting the efficiency scores of the hospitals is necessary. [3]
- (ii) List the data required in order to risk adjust the efficiency scores and comment on the data availability. [6]
- (iii) Discuss how assumptions for determining the price of the low cost product would differ with the introduction of the hospital network. [6]
- (iv) Describe other considerations that should be taken into account when setting up a hospital network for a low cost product. [4]

[19 marks]

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END OF PAPER