

EXAMINATION

9 November 2012 (am)

Subject F101 — Health & Care Fellowship Principles

Time allowed: Three hours

INSTRUCTIONS TO THE CANDIDATE

1. *Enter all the candidate and examination details as requested on the front of EACH OF your answer booklets.*
2. *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.*
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 (6) questions, beginning your answer to each question IN A SEPARATE BOOKLET.*
6. *Candidates should show calculations where this is appropriate.*

AT THE END OF THE EXAMINATION

Hand in your answer booklets, with any additional sheets firmly attached to the correct booklet, AND 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

You have just been appointed as the sales and marketing manager for a new insurance company that plans to only sell Critical Illness insurance.

- (i) The board has tasked you to present a paper to them on the possible distribution channels they could consider. Compare and contrast the advantages and disadvantages of each possible distribution channel. [10]
- (ii) The board has suggested that in order to reduce financial underwriting costs, the maximum sum assured should be set at one times the annual salary of the policyholder. Discuss this suggestion. [5]

[15 marks]

QUESTION 2

You are the actuary responsible for reserving for an insurer that sells short-term PMI business. You currently calculate reserves on a monthly basis for internal management accounts, and the CEO has expressed dissatisfaction with the month-to-month variation in your estimates.

- (i) Outline the types of reserves the insurer is likely to need to hold for its PMI policies. [3]
- (ii) Outline the possible reasons for short and long-term variability in reserving estimates and describe the checks you would do to ensure that your estimates are robust. [5]

A colleague has suggested that you use the Bornhuetter-Ferguson method instead of the chain ladder method.

- (iii) Compare and contrast these two methods. [6]

In investigating the month-to-month variation in your reserve estimates you realise that the number of payment runs is not consistent.

- (iv) Explain the impact this will have on your estimates if not allowed for. [3]

[17 marks]

PLEASE TURN OVER

QUESTION 3

A large, well established health insurance company has approached the reinsurance market with a reinsurance tender for its PMI and personal accident policies.

- (i) List, with reasons, why an insurance company may approach the reinsurance market. [4]
- (ii) Give suggestions on the suitability of different types of reinsurance for this insurance company? [6]
- (iii) The insurance company decides to put the following reinsurance structure in place on their PMI book of business:
- 90 / 10 quota share (insurer keeps 90% of each risk)
 - Individual excess of loss of R2m per life
 - Catastrophe cover of 90% of R50m excess R50m, with a 6 lives warranty

The insurer is insuring all the staff members of the Koeberg power station. A terrible catastrophe occurs. There is an explosion at the power station which results in 90 staff members needing significant medical attention and hospitalisation. The final claims costs per person were:

- R1m for 30 policyholders;
- R2m for a further 30 policyholders;
- R3m for 20 policyholders; and
- R4m for 10 policyholders

These are the only claims the insurer receives for the year.

Calculate (with written explanation) the split of the total claims between the insurer and the reinsurer. [10]

[20 marks]

PLEASE TURN OVER

QUESTION 4

The regulator of health insurance products in the country, Actuarial Society, has announced that all medical expense products need to include benefits for:

- Post-traumatic stress counselling
- Ante-natal care (for pregnant mothers)
- Dental checkup including fillings and extractions

These minimum benefits may not be funded from the savings account.

HealthyLife has been selling a medical expense product for a number of years that includes in-hospital cover and an optional savings account for out of hospital cover.

(i) Describe how the new regulation is likely to affect the HealthyLife product and how you would determine the impact on the price. [8]

(ii) Suggest ways that HealthyLife can manage the cost impact of these benefits. [4]

[12 marks]

QUESTION 5

A large PMI insurer is investigating launching a pre-funded long-term care product that will include a 7-day recuperation benefit following a large health event as well as the cost of care should the eligibility criteria (defined according to activities of daily living) be met.

(i) Discuss the issues involved in sourcing data that can be used for developing such a product. [8]

(ii) Comment on the proposed benefit structure and the assumptions that would be required for pricing. [7]

(iii) Discuss how the investment strategy for this product is likely to differ from that for the existing business of the insurer. [5]

[20 marks]

PLEASE TURN OVER

QUESTION 6

Lung cancer is the leading cause of cancer death for both men and women in the country, Avania. More people die of lung cancer than of colon, breast, and prostate cancers combined. Lung cancer is fairly rare in people under the age of 40. The average age of people found to have lung cancer is 60. In 2011 there are 173 770 new cases of lung cancer in Avania, with 160 440 people dying of this disease. The population of Avania in 2011 is 292m, 48% of whom are over the age of 40.

- (i) Explain the difference between incidence and prevalence of a disease. [2]
- (ii) Calculate the incidence rate of lung cancer in Avania for 2011. [2]
- (iii) Calculate the population mortality rate for lung cancer related deaths in Avania in 2011. Comment on the level of the mortality rate. [4]

A new technology has been developed that could detect pre-cancerous cells in the sputum. This technology can enable much earlier detection of lung cancer, reducing the fraction of lung cancer patients that die of their disease from 92% to 15%. Your test costs \$100 to perform. Assume that on average, 18 years of life are lost when a person dies of lung cancer.

- (iv) Calculate the cost to Avania in 2011 if all adults over 40 were screened with the new test. Compare the cost of the test to the saving on years of life lost for the lung cancer sufferers in 2011. [3]
- (v) A critical illness insurer in Avania is considering using the test as part of the underwriting process. You have been asked to make a recommendation on how this should be done. Discuss how you would include the test in the underwriting process. [5]

[16 marks]

END OF PAPER