SOCIETY OF ACTUARIES
Group & Health Specialty Exam

Exam GHSPC

Date: Friday, May 1, 2015
Time: 2:00 p.m. – 4:15 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 40 points.

   This exam consists of 4 questions, numbered 1 through 4.

   The points for each question are indicated at the beginning of the question.

2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.

3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.

2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.

3. The answer should be confined to the question as set.

4. When you are asked to calculate, show all your work including any applicable formulas.

5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets because they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate Exam GHSPC.

6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.

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Exam GHSPC Front Cover

****BEGINNING OF EXAMINATION****

1. (*9 points*) You are the valuation actuary for Keep It Running Insurance Company. The company offers two long-term care indemnity products with their own respective payment schedules.

You are given:

Time	Product 1	Product 2	Expected Continuance
0	\$500	\$200	100%
1 year	\$500	\$300	50%
2 years	\$0	\$500	20%

Each product has 1,000 members on claim at time 0.

For both products, assume the interest rate is 0% and that the experience is fully credible.

(a) (*2 points*) Based on the expected continuance, calculate the projected claim reserves for each product immediately following:

(i) the first payment; and

(ii) the second payment.

Show your work.

(b) (*3 points*) At the end of the first year Product 1 has 600 members and Product 2 has 400 members.

Determine the variance between actual and expected income in the first year. Show your work.

(c) (*2 points*) For Product 2, membership at the end of the first year was actually determined to be 380. Calculate the change in income at the end of year 1. Show your work.

(d) (*1 point*) Describe methods to adjust for the impact of unreported deaths.

(e) (*1 point*) Describe other ways the income statement for long-term care indemnity insurance could be distorted and the effect these distortions have on the income statement.

2. (*11 points*) You are a valuation actuary at Admiral Insurance Company working on Admiral's risk-based capital (RBC) calculations. Admiral's current RBC level is 450%.

(a) (*1 point*) Your boss has compared Admiral's RBC ratio to a competitor, Cadet Reed Insurance Company, which has an RBC of 700%. Your boss concludes that Cadet Reed is in a better financial position than Admiral.

State whether you agree with his opinion. Justify your answer.

(b) (*3 points*) Calculate the Mandatory Control Level given the following:

Asset Risk for Affiliates	50	(millions)
Asset Risk for Other Assets	36	
Underwriting Risk	103	
Credit Risk	10	
Business Risk	17	

Show your work.

(c) (*2 points*) There is a market shock, and your total assets fall to $200 million. Determine if any regulatory action is warranted. Show your work.

(d) (*3 points*) Following the asset drop, Admiral buys reinsurance to protect itself from greater than expected claims. Admiral purchases reinsurance for $2 million in cash that protects itself from 90% of aggregate claims above $18 million.

You have been given the following probability distribution of Admiral's Losses:

Loss (millions)	Probability
0	90.00%
100	5.00%
300	3.00%
500	1.50%
800	0.50%

The RBC formula in Admiral's state allows direct reduction of the Underwriting Risk value by the expected value of covered reinsurance claims in calculating the RBC.

Calculate the revised RBC ratio. Show your work.

(e) (*2 points*) Explain the directional impact the purchase of reinsurance may have on the risks that are included in the RBC formula.

3. (*7 points*) You are a consulting actuary who has been hired by Bell Insurance, Inc., to assist in the due diligence of the acquisition of a block of business. Bell needs an explanation of each item within the actuarial appraisal.

You have been provided the following financial information related to the potential block of business:

Items Affecting Cash Flow	Net Present Value of Items (Millions)
Premium	$2,450
Investment Income	$110
Benefits	$1,770
Expenses	$310
Commissions	$120
Increase in Statutory Reserves	$50
Taxes	$110
Increase in Required Capital	$70

(a) (*1 point*) Describe circumstances that lead to buyer and seller fit in an acquisition.

(b) (*2 points*) Explain in detail the three components of an actuarial appraisal.

(c) (*1 point*) Describe common sources used to develop assumptions in an actuarial appraisal.

(d) (*3 points*) Calculate the value of the block of business that Bell is considering acquiring. Show your work.

4. (*13 points*) You are a consulting actuary who has been retained by ITCA, a health insurance company, to review its current predictive modeling capabilities. The following is an excerpt from the model and four sample members:

Regression Formula		Member Values			
Variable	**Model Coefficient**	**Male #1**	**Male #2**	**Female #1**	**Female #2**
Filled Prescription	\$412	2	0	3	2
Number of Therapeutic Classes	\$438	2	0	1	2
Prior Period Claim Cost	0.40	\$1,200	\$550	\$2,200	\$1,100
Condition 1	\$782	1	0	1	0
Condition 2	\$3,251	0	0	1	0
Condition 3	\$1,278	0	1	0	1
Total Number of Condition Categories	\$124	3	2	3	4
Intercept	−\$55	1	1	1	1
Actual Cost		\$2,178	\$392	\$15,781	\$7,982

In addition to your technical review, you have been asked to give an overview of predictive modeling to ITCA leadership.

(a) (*1 point*) Describe key risk factors that indicate that an individual will generate high claims.

(b) (*2 points*) Describe ways to evaluate the quality of a predictive model.

(c) (*4 points*) Calculate the predicted cost using ITCA's current model for:

(i) Male #1,

(ii) Male #2,

(iii) Female #1, and

(iv) Female #2.

Show your work.

(d) (*4 points*) Draft a report to ITCA citing at least three changes that should be considered in the current model based on the predicted versus actual results. Justify your answers.

4. Continued

(e) (*2 points*) Another consultant claims to have created a model with an R-squared statistic 0.02 higher than the current model by adding 10 additional variables. The consultant states that her model is superior due to the higher R-squared.

Critique the consultant's assertion and justify your answer.

****END OF EXAMINATION****

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