SOCIETY OF ACTUARIES
Group and Health – Design & Pricing

Exam DP-GH

MORNING SESSION

Date: Thursday, October 29, 2009
Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 120 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 60 points).

   a) The morning session consists of 10 questions numbered 1 through 10.

   b) The afternoon session consists of 11 questions numbered 11 through 21.

   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 since 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 morning or afternoon session for Exam DP-GH.

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 DP-GH

****BEGINNING OF EXAMINATION****
Morning Session

1. (*3 points*) You are the group pricing actuary for a U.S. insurance company. You have been asked to educate a new underwriter about the small group market.

(a) Identify products typically offered to small groups and describe their characteristics.

(b) Explain the distribution channels used.

(c) Describe group characteristics a small group underwriter should consider and the importance of each.

2. (*4 points*) You are the Chief Underwriter for a small U.S. health insurance company. Historical financial results have shown cyclical patterns of gains and losses. This pattern has persisted for several years, but more recently, the duration of gains and losses has increased.

(a) Explain causes for the cyclical pattern of operating gains and losses.

(b) Describe factors that may have contributed to the change from the past pattern of operating gains and losses.

(c) Explain ways to manage the underwriting cycle in the future.

3. (*13 points*) You are the consultant for Company ABC that is planning to introduce a flexible benefits plan in 2010. Details regarding the 2008 health plan costs are as follows:

Total Cost (including Expenses)	Number of Employees with Single Coverage	Average Annual Cost per Employee with Single Coverage	Number of Employees with Family Coverage	Average Annual Cost per Employee with Family Coverage
$0	50	$0	25	$0
$1 - $2,500	95	$950	150	$1,500
$2,501 - $5,000	50	$2,650	325	$3,900
>$5,000	55	$5,700	250	$7,000
Total	250	$2,145	750	$4,323

Employee contributions under the current health plan are 20% of total cost.

You are given the following assumptions for the health options under the new flexible benefits plan:

Flex Plan Option	Relative Value
A	70%
B (current plan)	100%
C	120%

2008 Total Cost (including Expenses)	Expected Flex Plan Choice (Same for Single and Family)
$0	100% to Plan A
$1 - $2,500	50% to Plan A (at average annual cost) 50% to Plan B (at average annual cost)
$2,501 - $5,000	50% to Plan B (at average annual cost) 50% to Plan C (at average annual cost)
>$5,000	100% to Plan C

Flexible benefits pricing structure: Credit-based pricing with option price tags based on pure actuarial levels (i.e. unadjusted)

Annual trend factor: 12%

3. Continued

(a) (*2 points*) Describe the advantages and disadvantages to ABC of each of the following crediting strategies based on typical employer objectives:

(i) Family credits

(ii) Average credits

(iii) Single credits

(b) (*7 points*) Calculate the total expected employer cost in 2010 for the new flexible benefits plan under each of the crediting strategies listed above and compare each to the current plan expected cost. Show your work.

(c) (*4 points*) Your client wants to ensure that the flexible benefits plan costs are no higher than what the costs would have been under the prior program. Evaluate whether the average crediting strategy under the proposed pricing structure meets this objective. Show your work.

4. (*5 points*) You are the pricing actuary for Regional Medical Insurance Company responsible for the fully insured mid-sized group medical market (51 to 500 employees). This segment has shown declining market share and poor profitability. Your CFO believes the problem is that your prospective experience rating formulas do not accurately reflect experience of your mid-sized groups.

(a) Explain the reasons for experience rating including considerations in reflecting a group's past experience when setting rates.

(b) Describe the rationale for pooling in experience rating formulas and various pooling methods that can be used.

(c) Describe retrospective experience rating and explain how it could address your CFO's concerns.

(d) Describe a typical experience refund formula and its components.

5. (*6 points*) You are an actuary for Viking Insurance. You have been asked to price a new Group PPO product with the following coverage.

In-network: 100% coverage, with copayments for the following service categories:

Service Category	Cost Sharing (Copayment)
Emergency Room	$50
Office Visits	$15

Out-of-network: $1,000 deductible, 80% coinsurance to an out-of-pocket limit of $2,000 (including deductible), after which the benefit is covered at 100%.

From past experience, the company expects 90% of claims to be in-network and 10% out-of-network.

The company's target loss ratio is 85%.

Expected claim distributions are as follows:

In-network claims

Service Category	**Annual Utilization Per 1,000**	**Average Charge After Discount**	**Gross Claim Costs PMPM**
Hospital Inpatient			
Medical	130	$1,970	$21
Surgical	84	$3,652	$26
Psychiatric	26	$699	$2
Others	27	$375	$1
Hospital Outpatient			
Emergency Room	207	$447	$8
Surgery	122	$1,783	$18
Radiology	277	$951	$22
Others	451	$165	$6
Physician			
Inpatient – Surgery	117	$1,681	$16
Outpatient – Surgery	639	$846	$45
Office Visits	2,762	$41	$9
Preventive Services	700	$15	$1
Total			$175

5. Continued

Out-of-network claims

Total Annual Claims	Frequency
$0	0.250
$1,000	0.500
$6,000	0.235
$50,000	0.010
$120,000	0.005
Weighted Average: $3,010	1.000

(a) (*4 points*) Calculate the monthly gross premium PMPM for the new PPO product based on the above data. Show your work.

(b) (*2 points*) Describe rating variables to be considered when normalizing historical claim data to develop manual rates for a group product.

6. (*7 points*) You are the underwriter at LIFECO. You are asked to prepare a group life insurance quote for HIGH-RISK Company, which offers basic life insurance coverage of 2 times annual salary to its U.S. and Canadian employees. You have the following information for HIGH-RISK Company:

Number of employees	**Age**	**Average annual salary**
100	35	$35,000
350	40	$45,000
150	45	$75,000
75	50	$95,000

Experience group insurance monthly claim rate per $1,000	$0.50
Credibility	45%

You are using the following manual claim rate table for your pricing:

Age	**Monthly claim rate per $1,000**
35	0.13
40	0.17
45	0.23
50	0.35

Manual Claim Table Adjustment: Industry factor = 1.75
Expense, risk and profit charges = 15%

(a) Calculate the monthly gross premium rate to be charged to HIGH-RISK Company. Show your work.

(b) Describe other group life manual claim table adjustments that LIFECO should consider.

(c) Describe various options available to LIFECO to limit its risk on this potential client.

(d) Compare group life insurance tax treatment for Canadian and U.S. employees.

(e) Describe various provisions that would allow employees to keep some of their group life insurance coverage upon termination of employment and how these provisions would impact pricing.

7. (*7 points*) You are the chief actuary of an individual health carrier. Market intelligence indicates a typical individual medical policy has a current market price of $3,000 for a standard risk male, age 45.

Your company has an asset share pricing model, with the following assumptions for the above demographic and plan:

				Expenses				
Policy Year	Lapse Rate	Premium Trend	Durational Incurred Claims Loss Ratios (% of premium)	Commission Scale (% of premium)	Per Policy	Other Expenses (% of premium)	Claim Admin (% of claims)	Cost of Capital (% of premium)
1	40%	15%	40%	25%	$150	35%	2%	3%
2	30%	15%	60%	5%	$15	10%	2%	3%
3	30%	15%	80%	5%	$15	10%	2%	3%

Other assumptions:

- Three year pricing horizon
- Annual discount rate for percent of premium profitability: 10%
- Premium, claims, expenses and taxes are paid mid-year
- Federal Income Tax rate on operating profits: 35%
- Required Capital: 20% of premium

(a) (*2 points*) Explain the concepts of cost of capital and return on equity (ROE).

(b) (*1 point*) Describe methods that can be used to validate a pricing model.

(c) (*4 points*) Calculate the after-tax ROE for the plan assuming you charge current market prices. Show your work.

8. (*6 points*) Your plan has been approached by two disease management vendors to improve the medical care of your chronic population. You are given the following population statistics:

Period	2009
Chronic Population Inpatient Admissions	30,000
Utilization (Admission) Trend	5.3%
Cost/Admission	$7,500
Unit Cost Trend	0%

The following table summarizes the vendor's proposals for 2010:

	Vendor 1	Vendor 2
Inpatient Claim Cost Savings	$22,000,000	$21,000,000
ROI	3.5	3.3
ROI Basis	Gross	Net

(a) Describe program costs that should be considered when calculating program savings.

(b) Compare Medical Home programs with traditional Disease Management.

(c) Calculate the minimum utilization reduction needed to achieve the inpatient savings proposed by Vendor 1. Show your work.

(d) Recommend which vendor to choose and justify your recommendation. Show your work.

9. (*6 points*) You are the group pricing actuary for a small health plan that is developing new Consumer-Driven Health (CDH) products. You are given the following information:

Discrete Cumulative Claim Probability Distribution for Years 1, 2, and 3

Annual Claims	Probability	Cumulative Probability
$0	0.25	0.25
$500	0.40	0.65
$2,000	0.30	0.95
$10,000	0.05	1.00

Proposed CDH and Current Indemnity Plan Design

Benefit Plan in Years 1, 2, and 3	CDH	Indemnity
Deductible	$1,500	$250
Member Coinsurance – Cost Sharing	0%	10%
Member Out-of-Pocket Maximum (Excluding Deductible)	$0	$1,250
Health Savings/Reimbursement Account Annual Contribution	$600	$0

Random Number Trials for Sample Individual-Drawn from $U(0,1)$ Distribution

	Sample Individual
Year 1	0.66
Year 2	0.76
Year 3	0.15

(a) Describe historical industry trend experience for CDH products and other trend considerations in the first several years of implementation.

(b) Describe historical industry experience for member cost-sharing on CDH products.

(c) Calculate the probability of an employee paying more in cost sharing in one year under the proposed CDH design compared with the Current Indemnity Plan Design. Show your work.

(d) Calculate the Health Account Balance at the end of three years using a stochastic simulation and the given random number trials for the sample individual. Show your work.

10. (*3 points*) You are the Product Development Actuary for MOSTLY LIFE Insurance Company. You want to expand the company's offering to include group long term disability and critical illness products, but your boss insists that similar coverage already exists through the group life product.

(a) Compare typical disability benefits included in group life products to:

(i) group long term disability benefits

(ii) critical illness benefits

(b) Describe other coverages available to protect an individual's income in the event of disability.

****END OF EXAMINATION****
Morning Session