SOCIETY OF ACTUARIES
Group & Health Specialty Exam

Exam GHSPC

Date: Tuesday, October 27, 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.

1. (*10 points*) You are the pricing actuary for Company YWCH, a company serving the individual insurance market. YWCH has traditionally offered Plan A in its individual health markets. A 15% rate increase has been approved for 2015. YWCH will begin to offer a new high deductible plan, Plan B. You are tasked to review the anti-selection risk as a result of the new plan.

You have received basic health status reports that classify members into two risk classes of expected medical expense, which are called "standard" and "preferred."

You were given the chart below of 2014 business experience, and the following assumptions:

2014 Population	**Plan A**
Annual Premium per Policy	$7,200
Inforce	400 preferred insureds 600 standard insureds

- benefit buydown impact of Plan B's reduced benefits is 12% lower than the cost for Plan A
- population had a 95% loss ratio in 2014
- preferred insureds had uniformly 10% lower claim costs than the standard insureds
- 0% trend
- overall lapse rate of 0% for the block of business
- all members were in the plan for the entire calendar year

(a)   (*2 points*) Discuss the key considerations in modeling anti-selection and recommend a methodology for this situation.

(b)   (*2 points*) Calculate the average expected premium for each plan in 2015, assuming 80% of the healthy insureds and 10% of the unhealthy ones in plan A will move to Plan B. Show your work.

(c)   (*6 points*) After further analysis you determine that the benefit buydown from Plan A to Plan B is actually worth only 5% for preferred members and is worth 20% for standard members.

Calculate the buy-down effect and the premium leakage that occurs in 2015. Show your work.

2. (*11 points*) You are an actuary specializing in enterprise risk management for Standard Insurance Company. Standard is reviewing its enterprise risk management framework with respect to some of the key projects it is working on.

Standard's hurdle rate is 3% and its estimated rate of growth of cash flow is 5%.

Standard has two key projects on which economic income is measured, Project A and Project B, about which the following information is given:

	Project	
	A	B
Risk-adjusted return on capital	6.0%	8.0%
Economic capital invested (millions)	$70	$40
Covariance of Project with total loss	1.4	0.9

The base standard deviation of the total loss for these projects is 1.25.

(a) (*1 point*) Describe the key components of a definition of economic capital.

(b) (*2 points*) Compare the advantages of an internal capital model and a generic capital model.

(c) (*1 point*) Describe the differences between the Factor Table and Stress Test approaches when testing economic capital models.

(d) (*3 points*) Determine which of these projects generates

    (i)   the greatest Shareholder Value and

    (ii)   the greatest Shareholder Value Added.

    Show your work.

(e) (*4 points*) Using the Euler capital allocation principle, determine if the current distribution of economic capital allocated to each of the projects is reasonably optimized, or suggest a better allocation of capital. Show your work.

3. (*7 points*) You are a consulting actuary who has been hired by LW, a company that sells LTC (long-term care) and annuities. LW is considering purchasing a block of LTC policies from HO, a health insurance company.

You are given that the current risk-free rate of return on investments is 2%, the expected rate of return for the market is 6%, and the relative risk factor of the LTC block that HO is selling is 2.5 compared to the market. LW has asked that any rate of return calculations adhere to the CAPM model.

(a) (*1 point*) Describe the criteria that you as the actuary must meet to ensure that potential conflicts of interest are appropriately addressed before work on this project begins.

(b) (*2 points*) Identify and describe the components of your actuarial appraisal.

(c) (*2 points*) Identify and describe the key assumptions that should be included and disclosed within the actuarial appraisal report.

(d) (*2 points*) After performing your actuarial appraisal, you determine that the effective rate of return that could be achieved on this block is 7.0% per year.

   (i) Describe in detail any formulas necessary for this calculation.

   (ii) Determine whether this rate of return would be acceptable.

Justify your answer and show your work.

4. (*12 points*) You are an actuary for a consulting firm who has been asked to develop a clinical-based risk adjustment model. You are currently working on the portion of the model related to cardiac conditions. You are given the following information:

Diagnosis Code ICD-9-CM	Description	Average PMPM Cost
402.01	Malignant hypertensive heart disease with heart failure	$45,000
402.11	Benign hypertensive heart disease with heart failure	$15,000
402.91	Unspecified hypertensive heart disease with heart failure	$20,100
404.01	Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV	$56,100
404.11	Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	$38,500
404.91	Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	$18,700
428.10	Left heart failure	$21,800
428.20	Unspecified systolic heart failure	$15,700
428.30	Unspecified diastolic heart failure	$32,000
428.40	Unspecified systolic and diastolic heart failure	$40,000
428.90	Unspecified heart failure	$24,900
	All Heart Disease Codes	$29,836

(a) (*1 point*) Identify the most common types of data that are available in building a risk-adjustment model.

(b) (*2 points*) Describe the challenges in constructing a condition-based model.

(c) (*7 points*) Construct a code grouping system for the codes given above using exactly four severity levels, and calculate the average and relative costs of those severity levels using the average of all codes in each level. Justify your code groupings, and show your work.

4. **Continued**

(d) (*2 points*) You are given that Mr. Jones currently has diagnosis code 402.91 and average monthly claim costs of $7,000. Mr. Jones' condition just changed, and his diagnosis code changed to 428.40 and his average monthly expenses increased to $35,000. Using your model,

(i) Calculate what Mr. Jones' new predicted cost would be after his condition changed, and

(ii) Calculate the difference between Mr. Jones' actual versus expected new cost.

Show your work.

END OF EXAMINATION

USE THIS PAGE FOR YOUR SCRATCH WORK

USE THIS PAGE FOR YOUR SCRATCH WORK

USE THIS PAGE FOR YOUR SCRATCH WORK