

CSP-GH Model Solutions

Fall 2012

1. Learning Objectives:

3. Evaluate techniques for claims and disease management.

Learning Outcomes:

- (3f) Estimate savings, utilization rate changes and return on investments.

Sources:

Managing and Evaluating Healthcare Intervention Programs, Duncan, 2008, Chapter 6, pgs 104 - 107

Commentary on Question:

The question tested the student's ability to evaluate a disease management program by comparing two programs.

Solution:

- (a) Briefly describe:

- (i) Return on Investment (ROI)
- (ii) Average Savings
- (iii) Marginal Savings

Commentary on Question:

Part (a) asked the student to describe several metrics – ROI, average and marginal savings. Many students simply listed the formula to calculate these metrics rather than describing what they were. Some students were confused about whether to use net or gross ROI.

- (i) ROI for a disease management program is a measure of the savings earned by the program over the cost of the program.
 - (ii) Average Savings is the savings from the program less the cost of the program over the entire population.
 - (iii) Marginal Savings are the incremental net savings generated by adding the additional members to the program over the additional members.
- (b) Explain why average and total savings, as opposed to ROI, are critical measurements in the evaluation of DM programs.

1. Continued

Commentary on Question:

Part (b) tested the students understanding of what these metrics meant. Very few students provided an appropriate answer. Some repeated the definition of the metrics but did not really evaluate the pros and cons.

Total savings is a better measure than ROI to evaluate a DM program because it shows the bottom line impact to the financial results that a company can expect to see. The ROI value does not give the company a sense of the dollar savings or dollar cost so it is difficult to make financial decisions. Also, marginal savings help a company decide how large to make the program and whether or not it is economical.

- (c)
- (i) Calculate the ROI and per member per month (PMPM) Average Net Savings for the two programs. Show your work.
 - (ii) Calculate the Marginal Net Savings Per Chronic Member Per Month (PCMPM) for the first 100 and next 400 members. Show your work.
 - (iii) Recommend a program. Justify your answer

Commentary on Question:

Part (c) asked the student to actually calculate the metrics. The majority of students did very well. The most common error was using the wrong population (total vs. chronic members) and not dividing by 12 in the pmpm calculations. Although most students completed the math correctly, only about half of the students developed the appropriate recommendation. Also, some students were confused as to whether they should use net or gross ROI.

- (i) $ROI = \text{Annual Gross Savings} / \text{Annual Cost}$
Program 1: $140,000/55,000 = 2.5$
Program 2: $440,000/260,000 = 1.7$
Average Net Savings pmpm =
 $(\text{Annual Gross Savings} - \text{Annual Cost})/\text{Total Member Months}$
Program 1: $(140,000 - 55,000)/(10,000 * 12) = \0.71
Program 2: $(440,000 - 260,000)/(10,000 * 12) = \1.50
- (ii) First 100 members:
Marginal Net Savings per chronic member per month =
 $(\text{Annual Gross Savings} - \text{Annual Cost})/(\text{Chronic Member Months}) =$
 $(140,000 - 55,000)/(100 * 12) = \70.83

1. Continued

Next 400 members:

Marginal Net Savings per chronic member per month =
(Marginal Savings – Marginal Cost)/(Marginal Chronic Member
Months) = $((440,000 - 140,000) - (260,000 - 55,000)) / (400 * 12) =$
\$19.79

- (iii) Although the ROI is higher for DM program 1, ROI is not the best measure to use when selecting a DM program. The average net savings is twice as high for DM program 2. Therefore I would recommend implementing program 2.

2. Learning Objectives:

9. Evaluate the impact of regulation on company/plan sponsor financial management.

Learning Outcomes:

- (9a) Evaluate the interrelationship of state versus federal regulation on company financial management and marketing.
- (9b) Compare the primary federal regulations with which an employer must comply when offering benefit plans.

Sources:

GH-C101-07: pages 2-3, 15-17

Commentary on Question:

In general, candidates did not provide enough detail for any of the parts of this question, so very few candidates received significant points.

Solution:

- (a) List what is considered advertising with respect to Accident and Sickness Insurance (other than Medicare Supplement).

Commentary on Question:

Many candidates listed types of advertising and did not tie their answer to A&S insurance.

- Advertising includes printed and published materials such as direct mail, newspapers, magazine, radio/tv scripts and websites
 - Descriptive literature and sales aids issued by an insurer or agent to insurance-buying public
 - Including booklets, illustrations and form letters
 - Prepared sales presentations and materials used by agents and brokers
 - Does not include training materials, in-house material or court-ordered materials
- (b) Outline the renewal, cancelability and termination provisions that must be included in the advertising.

Commentary on Question:

Many candidates listed and described TYPES of renewal provisions (i.e. guaranteed renewal) as opposed to the disclosure requirements of such provisions in advertising.

2. Continued

- Advertisements must disclose the renewal, cancellability and termination provisions in a prominent manner
 - Must also disclose if benefits or premiums can be revised, because of age or other reasons
 - Disclose limitations, such as age limits, or aggregate limits
 - If it's a cancellable policy, must indicate that it's cancellable/renewable at the option of the company
 - Can't exaggerate if policy is guaranteed renewable
 - Define terms as needed
- (c) Outline the requirements for a script if a famous celebrity or sports figure was to endorse an insurance product in an advertisement.

Commentary on Question:

The question was related to specific requirements for endorsements rather than general advertising/policy requirements. Many candidates listed the same two or three points, and missed many other available points. In addition, many candidates listed the same erroneous points such as "the spokesperson must actually own the product they are endorsing."

- Endorsements must be genuine, the current opinion of the author and applicable to the policy
- Must get confirmation if used more than a year
- Must prominently disclose financial interest in beginning of ad
 - Okay to say "paid endorsement"
 - Not necessary if just union scale wages
 - Also significant travel expenses
- A spokesperson if:
 - Has a financial interest as stockholder, director, employee, etc
 - Directly or indirectly compensated
 - In a policy-making position
 - Formed or controlled by insurer
- Must reflect current practices and be applicable to policy being advertised
- Must retain specific claim data used for at least 4 years

3. Learning Objectives:

11. Prepare a Statement of Actuarial Opinion (SAO) for selected health matters.

Learning Outcomes:

(11a) Describe the U.S. Qualifications Standards and Statements of Actuarial Opinion (SAOs) as outlined in the Standard.

(11d) Discuss approaches to deal with obstacles to producing an unqualified SAO.

(11f) Describe the continuing education credits for signing SAOs.

Sources:

GH-C30-10

Code of Professional Conduct

MAAA Qualification Standards

ASOP 25

Commentary on Question:

Candidates maximizing credit for this question took note of the verbs used in the question (particularly “describe” in the first and third part) and the total point value of each part of the question. Many candidates glossed over the third part of the question, which was worth the most exam points (3, as opposed to 2 for each of the first two parts).

Solution:

(a) Describe the steps the ABCD will take.

Commentary on Question:

Candidates who “described” each step rather than “listing” the steps received much more credit.

1. Initiation of Inquiry
 - Complaint received and reviewed by staff for completeness
 - Sent to subject actuary for a response
2. Chair’s Review
 - Chair decides whether to seek additional information, dismiss the complaint, offer mediation, or commence an investigation
3. Notification
 - Notify the subject actuary and complainant of Chair’s decision
4. Investigation
 - Appoint an investigator who reviews documentation, interviews individuals and prepares a report sent to the subject actuary for response

3. Continued

5. ABCD Consideration
 - ABCD decides whether to seek additional information, dismiss the complaint, counsel the actuary or conduct a hearing
6. Notification
 - Notify the subject actuary, complainant and investigator of the decision
7. Hearing
 - If necessary, conduct a hearing attended by the subject actuary, who can present his/her case
8. Deliberations
 - ABCD decides whether to dismiss the complaint, counsel the actuary, recommend discipline, or seek additional information
9. Notification
 - Notify the subject actuary, complainant and investigator of the decision
10. Member Organization
 - ABCD notifies the member organizations, who may choose to impose the recommended level of discipline

(b) List and explain the precepts that may have been violated by:

- (i) You
- (ii) The state actuary

Commentary on Question:

Most candidates were able to identify that Precept 2 (Qualification Standards) may have been violated by you. Very few candidates recognized the importance of Courtesy and Cooperation (Precept 10) in professional conduct. It should be noted that Precept 13 states that an Actuary with knowledge of a violation of the code should *consider* discussing the situation with the other Actuary, but does not require it.

I have been accused of violating Precept 2, Qualification Standards, which states that work should only be performed when qualified to do so on the basis of basic and continuing education and experience.

The state actuary may have violated Precept 10, Courtesy and Cooperation. By failing to contact me prior to raising a complaint with the ABCD, the state actuary may not be acting with professional respect.

Other precepts that may have been violated include:

- Precept 3: Standards of Practice
- Precept 13: Violations of the Code of Professional Conduct

3. Continued

- Precept 14: which requires that an actuary respond promptly, truthfully and fully to any request for information from the ABCD
- (c) Describe the Qualifications and Rules you must follow to sign an Actuarial Memorandum per the American Academy of Actuaries (AAA).

Commentary on Question:

Candidates generally performed poorly on this question. Many confused the SOA CPD requirements with the continuing education requirements of the AAA. Few candidates fully described the elements of the Qualification Standards: more precise language regarding the content and timing of continuing education, for instance, received far more credit than simply stating the requirement.

The Basic Education and Experience Requirement states that the actuary must:

1. Be a Member of the Academy or fully-qualified member of another actuarial organization (SOA, CAS, etc.); and
2. Have three years of responsible actuarial experience, which is defined as work that requires knowledge and skill in solving actuarial problems.

Actuaries must also document at least 30 hours of Continuing Education in the year prior to the year issuing the SAO. The 30 hours should include:

- At least 6 hours of organized activities, which involve interaction with actuaries or other professionals working for different organization;
- At least 3 hours on professionalism topics; and
- No more than 3 hours on general business courses

Continuing education must be relevant, meaning that it:

- Broadens or deepens understanding of the work an actuary does;
- Expands knowledge in a related discipline that bears directly on the actuary's work; or
- Facilitates entry into a new area of practice.

4. Learning Objectives:

1. Analyze medical quality measures and their importance to companies, plan sponsors and members.
3. Evaluate techniques for claims and disease management.

Learning Outcomes:

- (1a) Describe impact of quality measures and how used by the stakeholders.
- (3f) Estimate savings, utilization rate changes and return on investments.
- (3h) Apply the actuarially adjusted historical control methodology.
- (3j) Apply methodologies to reduce random fluctuation and maintain validity for disease management effectiveness studies.
- (3l) Test actuarial methods for evaluating disease management savings outcomes.

Sources:

Healthcare Quality and Efficiency, pgs. 12 - 17

Healthcare Intervention Programs, Duncan, Chapter 6 and 12, pgs. 102, 119, 226

Commentary on Question:

The question is designed to test the candidates understanding of health care quality and efficiency, connect it to a disease management program that a company may implement, use different actuarial techniques to value the savings from a disease management program, and understand why these techniques produce different results. The candidates tended to perform well on this question, specifically in part (a) and (c). In part (b), many candidates utilized COPD member months rather than the total member months. Candidates that had errors in their calculations still received partial credit, if they outlined the correct formulas. Many candidates failed to provide formulas, and were unable to receive partial credit when they made calculation mistakes.

Solution:

- (a) Describe the limitations and measurement challenges in assessing healthcare quality and efficiency.

The US Health Care System is large, complex, and decentralized. There are many different Health System Stakeholders with different goals. The definition of quality can vary and there are different approaches to measurement. Also, the environment is changing due to new legislation, technology changes, and financial challenges.

4. Continued

- (b) Calculate the savings for each cohort. Show your work.

Membership is not needed in the calculations as it cancels out in the formula since Membership is constant in total year over year. COPD member months is not necessary for the calculation

$$((2010 \text{ Admits}/\text{Membership} * 12,000 * \text{Trend}) - 2011 \text{ Admits}/\text{Membership} * 12,000) * \text{Membership}/12,000 * \text{Current Cost per Admit} = \text{Savings}$$

Or

$$((2010 \text{ Admits} * \text{Trend}) - 2011) * \text{Current Cost per Admit} = \text{Savings}$$

COPD – Open

$$((4,100 * 1.05) - 3,800) * 7,875 = \$3,976,875$$

COPD – Closed

$$((4,100 * 1.05) - 3,200) * 7,875 = \$8,701,875$$

- (c) Explain possible differences in savings calculated between the open and closed cohorts.

The closed cohort is showing a greater savings when compared to the open cohort, \$8.702 Million vs. \$3.977 Million. Closed Cohort has the potential for regression to the mean. Open Cohort may be impacted by new entrants who meet the conditions for the study inclusion and enter in the current period increasing the PMPM. There may be population differences between the two groups as the open cohort may allow newer, healthier people into the program.

5. Learning Objectives:

4. Formulate and evaluate insurer claim reserving techniques.
10. Evaluate the risks associated with health insurance.

Learning Outcomes:

- (4f) Test adequacy of the reserves vs. actual claims experience.
- (10c) Complete a capital needs assessment:
- Calculate capital needs for a given insurer
 - Assess capital needs against assets
 - Determine actions needed to address issues identified by assessment
 - Understand key elements of NAIC and Canadian RBC models

Sources:

Group Insurance, Chapter 19, pgs. 373 and 376 – 378

ASOP #5

Commentary on Question:

Candidates performed very well calculating the RBC in part (b), but performed poorly answering parts (a) and (c).

Solution:

- (a) Describe the purpose and calculation of the managed care risk adjustment factor.

Commentary on Question:

Part (a) of the question required the candidate to demonstrate an understanding of the H₂ managed care risk adjustment factor from the NAIC RBC model from Learning Outcome (10c). Specifically, the candidate needed to describe the purpose AND calculation of the managed care risk adjustment factor. Candidates performed poorly on this question. Common pitfalls:

1. Candidate did not describe calculation as requested in the question.
2. Candidate described purpose as “reflecting managed care savings,” instead of the correct response of “reflecting contractual reimbursement in the predictability of future claims.”
3. Few candidates mentioned that greater predictability reduces risk and need for capital to support fluctuations, which was the main point of the question.
4. Many points were available for describing the various categories under the calculation portion of the question. Few candidates took advantage of these points.

5. Continued

Purpose

Certain contractual reimbursement arrangements with providers lead to greater predictability of future claims.

Greater predictability reduces risk and need for capital to support fluctuations.

Calculation

Claims from prior 12 months split into categories

Category 0 -- Fee-for-Service (FFS) / Usual Customary and Reasonable (UCR)

Category 1 -- Provider fee schedules, case rates, global rates

Category 2 -- Withhold or Bonus arrangement with provider

Category 3 -- Capitation Payments

Category 4 -- Staff Model HMO

Managed Care Risk Adjustment Factors is weighted average of factor for each category. Weights are the proportions of total claim payments by category.

Overall factor applied to all product groupings, excluding Medicare Part D and Other.

- (b) Calculate BLIC's Total Adjusted Capital (TAC) to Authorized Control Level (ACL) Ratio. Show your work.

Commentary on Question:

Part (b) of the question required the candidate to calculate the capital needs for a given insurer from Learning Outcome (10c). The student was given all of the variables to input into the appropriate RBC, TAC, and ACL formulas. Almost all students calculated the correct answer and received full credit for Part (b).

$$\begin{aligned} \text{RBCAC:} &= H_0 + \{ H_1^2 + H_2^2 + H_3^2 + H_4^2 \}^{1/2} \\ &= 5 + \{ 5^2 + 15^2 + 1^2 + 4^2 \}^{1/2} \\ &= 5 + \{ 25 + 225 + 1 + 16 \}^{1/2} \\ &= 5 + \{ 267 \}^{1/2} \\ &= 5 + 16.34 \\ &= 21.34 \end{aligned}$$

$$\begin{aligned} \text{ACL:} &= 1/2 \times \text{RBCAC} \\ &= 1/2 \times 21.34 \\ &= 10.67 \end{aligned}$$

$$\text{TAC:} = 16$$

$$\begin{aligned} \text{TAC / ACL} &= 16/10.67 \\ &= \mathbf{150\%} \end{aligned}$$

5. Continued

- (c) Assume the FFS payment based claims are overstated by 25% and all other non-Underwriting risks and TAC remain the same. Calculate a re-stated value of Underwriting risk, H_2 , and resulting TAC to ACL ratio. Show your work.

Commentary on Question:

Part (c) of the question demonstrates the impact of an actuary's reserves estimates on a company's capital requirements. A common mistake was calculating the 25% overstatement of FFS claims to be \$75M instead of the correct answer of \$80 M (100 / 125%). Another common mistake was calculating the Underwriting Factor using claims instead of revenue. Candidates that had errors in their calculations still received partial credit, if they outlined the correct formulas.

$$\text{FFS Claims:} = \frac{100}{125\%} \\ 80$$

$$\text{Cap Claims:} = 20$$

$$\text{Tot Claims:} = 80 + 20 = 100$$

Managed Care Risk Factor

$$\text{MC Risk:} = \frac{(\text{FFS Claims} \times \text{Factor} + \text{Cap Claims} \times \text{Factor})}{\text{Tot Claims}} \\ \frac{(80 \times 1.00 + 20 \times 0.40)}{100} \\ \frac{88}{100} \\ 0.880$$

Underwriting Risk Factor

$$\text{UW Risk} = \frac{(\text{Rev Tier 1} \times \text{Factor 1} + \text{Rev Tier 2} \times \text{Factor 2})}{\text{Total Rev}} \\ \frac{(100 \times 15\% + 25 \times 10\%)}{125} \\ \frac{17.5}{125} \\ 0.140$$

H_2 Risk Charge

$$H_2 = \text{Claims} \times \text{Risk Factor} \times \text{Managed Care Risk Factor} \\ 100 \times .14 \times 0.880 \\ 12.32$$

$$\text{RBCAC:} = H_0 + \{ H_1^2 + H_2^2 + H_3^2 + H_4^2 \}^{1/2} \\ 5 + \{ 5^2 + 12.32^2 + 1^2 + 4^2 \}^{1/2} \\ 5 + \{ 25 + 152.52 + 1 + 16 \}^{1/2} \\ 5 + \{ 194.52 \}^{1/2} \\ 5 + 13.95 \\ 18.95$$

5. Continued

$$\begin{aligned} \text{ACL:} &= \frac{1}{2} \times \text{RBCAC} \\ &= \frac{1}{2} \times 18.95 \\ &= 9.48 \end{aligned}$$

$$\text{TAC:} = 16$$

$$\begin{aligned} \text{TAC / ACL} &= 16/9.48 \\ &= \mathbf{168.8\%} \end{aligned}$$

- (d) List references from the Actuarial Standards of Practice #5 (ASOP #5), Incurred Health and Disability Estimates that could persuade the Chief Actuary to change his/her reserve approach.

Commentary on Question:

Part (d) of the problem demonstrates the issues that could result when an actuary does not follow actuarial standards of practice. Candidates scored poorly on this section mainly because they provided a list of what was covered in ASOP #5 that did not relate to the problem. Section 3.3.1 c. Margin for Uncertainty and Section 3.6 Follow-up Studies were the two references that related to margins and reasonableness in the liability estimates from ASOP #5.

Margin for Uncertainty

Estimate is for the true liabilities that will occur.

Margin should be appropriate under moderately adverse conditions.

Follow-up Studies

Test reasonableness of prior period incurred estimates over time.

6. Learning Objectives:

7. Integrate reinsurance arrangements with overall financial strategy of company plan/sponsor.

Learning Outcomes:

- (7a) Analyze the key risks that reinsurance will stabilize for a company's given line of business.
- (7b) Recommend a type of reinsurance for a given scenario.

Sources:

GH-C110-07: Pages 32-36

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Explain automatic excess coverage and facultative quota share reinsurance from the perspective of the ceding company and the reinsurer.

Commentary on Question:

Candidates did fairly well with the high-level concepts. Some provided the variations on the automatic excess. Some details were missed by all candidates, such as the reinsurer providing consulting guidance, and the request for facultative support on certain cases. There were almost no comments on aggregate coverage for facultative quota share.

Automatic Excess

Ceding company retains risk up to a certain dollar threshold. Reinsurer takes 100% of risk above the threshold.

Ceding company underwrites and administers business.

May need to take into consideration integration of workers comp and social security.

Variations:

1. Duration excess – based on a certain period of time
2. Aggregate coverage – cede over a specific aggregate amount

Facultative Quota Share

Ceding company shares a percentage of the premium and claims

Favored by smaller companies

6. Continued

Ceding company outsources underwriting and administration

Aggregate coverage not popular with reinsurers

- (b) Describe considerations in pricing for each type of reinsurance option.

Commentary on Question:

Many people answered a different question: what are considerations for selecting a reinsurer?

Automatic Excess

Methods:

1. Individual calculation of risk
2. Percentage of gross premiums

Consider leveraging of the deductible

Consider retention levels

Facultative Quote Share

Develop net rates, and then load risk, profit and expense charges

Can load net rates with ceding company expenses or reinsurer expenses

Reinsurer helps with claims administration

- (c) Calculate the reinsurance premium for each option.

Commentary on Question:

Some candidates calculated everything on a PMPM basis. Again, most of the credit was given here, but in order to get full credit, the total monthly premium needed to be calculated.

6. Continued

1. Excess		Expected	
	Risk above \$5K	Reins. Claims	
Member #1	1,000	10.00	
Member #2	-	-	
Member #3	3,000	30.00	
Member #4	5,000	50.00	
Total Expected Reinsurance Claims		90.00	
Admin and Profit Load		30%	
Monthly Reinsurance Premium		128.57	
(Claims/(1 - 0.3))			
2. Quota Share		Expected	Expected
	Claim	Gross Claims	Reins. Claims
		(1% of claims)	(90% of exp. claims)
Member #1	6,000	60.00	54.00
Member #2	3,000	30.00	27.00
Member #3	8,000	80.00	72.00
Member #4	10,000	100.00	90.00
Total Expected Claims		270.00	243.00
Reinsurer Admin and Profit Load			30%
Monthly Reinsurance Premium			347.14
(Claims/ (1 - 0.3))			

- (d) Calculate the reinsurer's annual profit/loss under both options if only member #1 has a claim. Assume the claim lasts for 6 months.

Commentary on Question:

Some candidates subtracted expenses from the premium to get the profit/loss, although this was not required to receive full credit. Some candidates used 6 months instead of 12 months of premium.

1. Excess			
Annual Premium = Monthly x 12		=128.57 * 12 =	1,542.86
Claims Per Month		=6,000 - 5,000 =	1,000.00
<u>Claims Per Year</u>		<u>=1000 * 6 =</u>	<u>6,000.00</u>
Reinsurer Profit/Loss (premium less claims)			(4,457.14)
2. Quota Share			
Annual Premium = Monthly x 12		=347.14 * 12 =	4,165.71
Claims Per Month		=90% * 6000 =	5,400.00
<u>Claims Per Year</u>		<u>=600 * 6</u>	<u>32,400.00</u>
Reinsurer Profit/Loss (premium less claims)			(28,234.29)

7. Learning Objectives:

2. Typical markets: Understands customer segments and how products are marketed to each.

13. Demonstrate an understanding of the accounting requirements and methodology regarding retiree life and health benefits.

Learning Outcomes:

- (13a) Determine appropriate baseline assumptions for benefits and population.

- (13b) Project future retiree benefit costs.

Sources:

Yamamoto Chapter 9, pages 280-281, 289-290

Deloitte Page 4

Commentary on Question:

Part (a) of this question was testing knowledge of the Projected Unit Credit method of developing actuarial liabilities as they relate to retiree obligations. In Part (b), the candidate was required to understand what amount is recorded on the company's balance sheet. In both parts, credit was given for showing an understanding of the concepts being tested and then for properly applying the understanding.

Solution:

- (a) Calculate the present value of the actuarial liability using the required attribution method under FAS 106, assuming there will be no decrements. Show your work.

Commentary on Question:

Candidates generally understood how to calculate the benefit amount that would be payable to the employee upon retirement. Very few candidates understood the project and prorate method of the Projected Unit Credit method. Note that no annuity function was provided in the question. Candidates could receive full credit without the annuity function. Additionally, credit was given to candidates who made an assumption for the annuity function or to candidates who valued the pension benefit as a perpetuity.

7. Continued

Projected salary at retirement = Current Salary trended 8 years at 3%;
Salary at retirement = $105,000 * (1 + 3\%)^8$
= \$133,011

Benefit at retirement = Salary at Full Retirement Age * Years of Service * %
Benefit = $\$133,010.86 * 20 * 1\%$
= \$26,602

Present value of benefits = Allocated benefit at current age discounted to
current time frame using the yield of high quality corporate bonds
PUC prorate numerator = current years of service = 12
PUC prorate denominator = years to earliest eligibility = 16
Discount factor = $1/(1 + 2.25\%)^8$
= $(\$26,602 * 12 / 16 / (1 + 2.25\%)^8)$
16,211

- (b) Calculate the amount PHI should recognize on its balance sheet to recognize the pension for the employee based on IAS 19 standards. Assume PHI will immediately recognize any gains or losses. Show your work.

Commentary on Question:

A small portion of candidates understood what type of amount should be recognized on the balance sheet. Some candidates attempted to calculate the amount that would be recognized on the income statement. Note that if PHI immediately recognized any gains and losses, they would do so on the income statement and there would be no amount to record on the balance sheet.

Amount recognized on the balance sheet is the PV of the defined benefit obligation using PUC, adjusted for unrecognized actuarial gains and past services costs, further reduced by the fair value of plan assets

PV of Benefit Obligations	\$(16,211)
Unrecognized Actuarial Gains	0
Unrecognized Service Cost	3,000
Fair Value of Plan Assets	<u>25,000</u>
	\$11,789

8. Learning Objectives:

5. Formulate and evaluate insurer reserving techniques for other liabilities.

Learning Outcomes:

- (5a) Describe different types of reserves and explain when each is required:
- Deficiency reserves
 - Active life reserves
 - Premium reserves
 - Deferred acquisition costs
 - Claim administration expense reserves
 - Calculate the reserves given data

Sources:

Individual Health, Chapter 10, pgs 331 - 333

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Prepare a cash-basis income statement for each year. Show your work.

Commentary on Question:

Most candidates answered fully. This was a straight forward question, but important to the overall goal of understanding how ALR and DAC interact with an income statement at a basic level.

Profit = Premiums – Cash Benefits paid – Expenses paid – commissions paid

Year 1 = \$100 – 15.39 – 15.00 – 40.00 = \$29.61

Year 2 = \$90 – 29.23 – 13.50 – 0 = \$47.27

Year 3 = \$80 – 41.54 - 12 - 0 = \$26.46

Year 4 = \$70 – 52.31 – 10.50 – 0 = 7.19

Year 5 = 60 – 61.53 – 9 – 0 = (10.53)

- (b) Explain how Active Live Reserves (ALR) are calculated and how they spread benefit costs over the policy life.

Commentary on Question:

The key to this question was “how calculated” and “how spread.” Answering the question by rearranging the question was not sufficient. The concept of net premiums was important. These shouldn’t be confused with just stating “premium.”

ALR can be calculated either prospectively or retrospectively.

ALR = Accumulation of past net premiums less morbidity/benefit costs

ALR = Present value of future benefits less PV of future net premium

8. Continued

To Calculate:

Ratio=Expected benefit costs/expected premiums over contract term, calculated on inception date

Ratio times gross premium for year minus benefits=ALR

By setting aside some of the premium from earlier years to cover costs in later years, increasing morbidity costs are pre-funded.

- (c) Calculate the ALR at the end of each year. Show your work.

Commentary on Question:

This calculation was straightforward.

$$\begin{aligned} \text{Net Premium} &= (15.39 + 29.23 + 41.54 + 52.31 + 61.53) \\ &\text{divided by } ((100+90+80+70+60)) \\ &= 50\% * \text{gross premium} \end{aligned}$$

$$\begin{aligned} \text{Year 1} &= .5 * 100 - 15.39 = 34.61 \\ &\text{or } (29.22 + 41.54 + 52.31 + 61.53) - (90+80+70+60)*.5 = 34.61 \end{aligned}$$

$$\begin{aligned} \text{Year 2} &= 34.61 + .5 * 90 - 29.23 = 50.38 \\ &\text{or } (41.54+52.31+61.53) - (80+70+60) * .5 = 50.38 \end{aligned}$$

$$\begin{aligned} \text{Year 3} &= 50.38 + .5 * 80 - 41.54 = 48.84 \\ &\text{or } (52.31 + 61.53) - (70-60) * .5 = 48.34 \end{aligned}$$

$$\begin{aligned} \text{Year 4} &= 48.84 + .5*70 - 52.31 = 31.53 \\ &\text{or } 61.53 - 60*.5 = 31.53 \end{aligned}$$

$$\begin{aligned} \text{Year 5} &= 31.53 + .5*60 - 61.53 = 0 \\ &\text{or } 0 \end{aligned}$$

- (d) Explain how the Deferred Acquisition Cost (DAC) is calculated and how it spreads expenses over the policy life.

Commentary on Question:

Many candidates struggled with putting in writing the underlying concept. It is important to fully understand what you are trying to accomplish with DAC, as real world applications are more complex.

Acquisition expenses occur near the inception of the contract. These are usually up-front admin costs for U/W and new business departments. Commissions are usually higher in the first year.

8. Continued

The first year commissions in excess of the ultimate rate can be deferred to future times. By releasing reserves at later times, the cost can be spread over several time periods.

Deferred expenses are amortized in level proportion to the gross premium over the policy lifetime.

- (e) Calculate the DAC balance at the end of each year. Show your work.

Commentary on Question:

Candidates needed to understand that DAC is in level proportion to the gross premium. In addition candidates needed to understand that the year 5 DAC was zero.

DAC = Deferrable expenses/present value of future premium

DAC % = $\$40 / (100 + 90 + 80 + 70 + 60) = 10\%$

Year 1 = $10\% * (90 + 80 + 70 + 60) = \30

Year 2 = $10\% * (80 + 70 + 60) = \21

Year 3 = $10\% * (70 + 60) = \$13$

Year 4 = $10\% * 60 = \$6$

Year 5 = $\$0$

- (f) Prepare a finalized income statement with both ALR and DAC effect for year 1.

Commentary on Question:

Candidates need to recognize that ALR decreases income in a period and DAC increases income.

Profit = Premiums

Minus Cash Benefits paid

Minus Expenses paid

Minus Commissions paid

Minus change in ALR

Plus change in DAC

Calculation

Premium	\$100.00
Cash Benefits	\$15.39
Expenses	\$15.00
Commission	\$40.00
Change in ALR	\$34.61
Change in DAC	<u>\$30.00</u>
Total	\$25.00

9. Learning Objectives:

4. Formulate and evaluate insurer claim reserving techniques.

Learning Outcomes:

- (4c) Calculate appropriate claim reserves given data.
- (4d) Identify adjustments to IBNR (margins, trend, seasonality, claims processing changes, etc.).
- (4e) Evaluate data resources and appropriateness for calculating reserves.

Sources:

2009 Spring Meeting Session 17

Group Insurance, Chapter 40, pgs. 850 – 851

Health Reserves, Chapter 3, pgs. 32 and 35

Commentary on Question:

Parts (a) and (b) were intended to test the candidate's understanding of how changes in claims submission and coding would impact a health plan in general and the reserving process in particular. Parts (c) and (d) were intended to test the candidate's ability to calculate a reserve by applying completion factors and to recalculate the reserve based on a change in the pattern of claims submission and adjudication.

Solution:

- (a) From a health plan's perspective,

Commentary on Question:

This part asked candidates to describe ICD-10 and identify its impacts on health plans. Candidates generally understood that ICD-10 is an update of ICD-9 and poses challenges both due to the new coding structure as well as the extent of systems and processes that are impacted.

- (i) Explain what ICD-10 is.

ICD-10 is an alphanumeric coding system used to classify diagnoses and procedures.

- (ii) Describe why the conversion will be a challenge to implement.

Implementation will be a challenge for two reasons:

- ICD-10 has many more codes than ICD-9 and the mapping is not well-defined
- Many systems and processes are impacted and will need to be updated to use the new coding system

9. Continued

- (iii) Identify the core business operations that will be impacted by this conversion.

Core business operations impacted by the conversion include:

- Claims and plan set-up
- Provider contracting / network management
- Medical management
- Fraud and abuse practices
- Customer service
- Actuarial and analytic services
- Sales and renewals
- Financial management systems

(b)

Commentary on Question:

This part asked candidates to think about the impact the ICD-10 conversion would have on the reserving process. Candidates generally recognized that the conversion will impact claims receipt and adjudication. Some candidates identified metrics the reserving actuary would consider but many others commented on processes and decisions that would be outside the reserving actuary's responsibilities. Finally, many candidates identified one or two actions the actuary might take but did not fully discuss the actions that should be taken.

- (i) Explain how the ICD-10 conversion will impact the reserving process.

The ICD-10 conversion will impact ICOS and IBNR completion patterns since changes are likely in:

- The timing and manner of claims submission by providers (since the mapping is not well-defined, there could be changes in how services are coded/reimbursed under ICD-10 from current practices)
- Claims adjudication and payment - adjudication is likely to slow as the health plan updates its systems and reacts to changes in how providers submit claims
- Claims inventory levels (or backlogs) resulting from system updates

- (ii) Identify metrics you should review to determine the impact on the reserving process.

The actuary should review claim inventory reports and compare statistics to historical patterns. This includes a review of:

- Claims received
- Claims processed
- Ending claims inventory

9. Continued

- (iii) Identify actions you will need to take based on the results of (ii).

The actuary should identify if changes have occurred in the claims inventory or claims receipt and processing patterns. If changes are identified, the actuary needs to consider the reserving method and make appropriate changes. The reserve calculated for ICOS may need to be revised if changes have occurred to claims processing patterns, including changes in the size or composition of the claims inventory. The reserve calculated for IBNR may need to be revised if changes have occurred in terms of when claims are submitted by providers or if there is an increase in claims that are being denied and resubmitted. The actuary should consider comparing the results of several reserving methods to identify any potential issues and may want to increase the PAD to reflect increased uncertainty in the reserve estimate.

- (c) Calculate the Incurred But Not Paid (IBNP) reserve for November and December incurral dates assuming no change in claim payment patterns. Show your work.

Commentary on Question:

Most candidates did well on this part. Candidates could have used either the total or product-specific data to calculate the reserve. It was expected that candidates would perform the reserve calculation using the values in the case study even though some results may have appeared inappropriate.

Using the summary data (amounts in '000s):

IBNP reserve = Incurred Claims – Paid Claims

NOTE: Paid Claims in this context are claims paid to-date and incurred in the given month. It is not correct to use the claims BR paid in a given month which are associated with all incurral months.

Incurred Claims = Paid Claims / IBNP Completion Factor

November reserve = $39,200 / 0.5934 - 39,200 = 26,860$

December reserve = $8,100 / 0.0759 - 8,100 = 98,619$

- (d) Calculate the IBNP reserve for November and December incurral dates reflecting the above adjustments. Show your work.

Commentary on Question:

The question inferred that Kate had prepared her analysis without considering the impact of the ICD-10 conversion on providers. Candidates were expected to identify that adjustments needed to be made either to the incurred and paid values or the completion factors to reflect a slow-down in provider submission of claims. Candidates struggled in interpreting this information. Common errors included increasing the paid and incurred amounts by 10% and 50% instead of dividing by 90% and 50% and applying the adjustment to both incurred and paid claims.

9. Continued

Candidates could have used either the total or the product-specific data to calculate the reserve.

Replace the Paid and Incurred amount in the calculation of Incurred Claims by the “Expected Paid and Incurred” calculated as Actual Paid and Incurred / Adjustment Factor.

$$\text{November Reserve} = (39,200 / 0.9) / 0.5934 - 39,200 = 34,200$$

$$\text{December Reserve} = (8,100 / 0.5) / 0.0759 - 8,100 = 205,339$$

10. Learning Objectives:

6. Evaluate financial performance measures for insurers for both short-term and long-term products.
12. Understand an actuarial appraisal.

Learning Outcomes:

- (6c) Compare key differences and similarities in measures by accounting basis (statutory, tax, GAAP).
- (12b) Describe components of an actuarial appraisal.

Sources:

Group Insurance, Bluhm, W. F., Fifth Edition, Chapter 17, pgs. 334 – 337

GH-C103-07: The Actuary and Health Insurance Mergers and Acquisitions

GH-C104-07: Mergers and Acquisitions, Toole and Herget

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Contrast US statutory financial reporting with US GAAP financial reporting.

Statutory

- The focus of statutory financial statements is to demonstrate the solvency of the insurer.
- Statutory financial reporting attempts to determine the value of the insurer if it was forced to liquidate.
- Statutory financial reports have a balance sheet orientation.
- Conservative standards of asset and liability valuation are mandated in statutory financial reporting.
- Statutory financial reporting tends to accelerate expense recognition and delay revenue recognition.

GAAP

- GAAP financial reporting standards provide a consistent framework and attempt to more accurately reflect the earnings during a reporting period.
- The focus of GAAP is on the income statement.
- GAAP financial reporting attempts to match the incidence of revenues and expenses.
- GAAP financial reporting attempts to determine the value of the insurer on a going concern basis.

10. Continued

Examples of statutory conservatism on the asset side of the balance sheet:

- Certain items are non-admitted assets (assets not allowed in the determination of statutory solvency).
- The NAIC prescribes asset values to be used, rather than allowing flexibility.
- Deferred acquisition costs, which GAAP accounting allows as an offset to reserve liabilities, are not allowed.

Examples of statutory conservatism on the liability side of the balance sheet:

- Lapses may be assumed in policy reserve calculations only in specific circumstances, including certain health policy reserves.
- Minimum morbidity and mortality tables, which generally include material conservatism, are typically required when determining reserves.
- Maximum interest rates (to be used in setting reserves) are usually specified.
- AVR and IMR, required reserves intended to provide a cushion against investment losses and interest rate fluctuations.

Major modifications to statutory reporting necessary to produce GAAP financial results are as follows:

- Removal of some of the conservatism in reserving assumptions
 - GAAP reserves still include some conservatism, referred to as “provision for adverse deviation”
 - Full recognition of deferred taxes
 - Recognition of the market value of most assets
 - Recognition of lapses in reserves
 - Capitalization of deferred acquisition costs
 - Recognition of all receivables and allowances
 - Removal of the AVR and IMR
- (b) Calculate the total assets and total liabilities on a statutory basis as of December 31, 2011, assuming that all the needed adjustments are captured in the table above. Show all work.

Commentary on Question:

The majority of the candidates made a satisfactory attempt at the calculation. Many answers mixed up the adjustment components between Assets and Liabilities. For example, the liability components were made to the Asset calculation and the asset components to the Liability calculation.

Adjustments on Assets:

For fixed maturity securities	
Statutory	1,580
GAAP	<u>1,703</u>
Adjustment	-123

10. Continued

Agents' balances is non-admitted assets under statutory	
Statutory	0
<u>GAAP</u>	<u>52</u>
Adjustment	-52
Total Statutory Assets =	21,479 – 123 – 52 = 21,304

Adjustments on Liabilities:

Actuarial and Policy Liabilities

Statutory	8,464
<u>GAAP</u>	<u>8,230</u>
Adjustment	234

Asset Valuation Reserve

Statutory	15
<u>GAAP</u>	<u>0</u>
Adjustment	15

Interest Maintenance Reserve

Statutory	23
<u>GAAP</u>	<u>0</u>
Adjustment	23

Total Statutory Liabilities = 10,052 + 234 + 15 + 23 = 10,324

- (c) Describe and explain the components of an actuarial appraisal.

Commentary on Question:

The majority of the candidates answered this question with little detail. Some candidates confused Actuarial Appraisal with Actuarial Opinion.

(i) Adjusted net worth of the business as of the valuation date

- Most actuarial appraisals are presented on a statutory accounting basis, as of a particular 'appraisal date.'
- The adjusted net worth of the business is typically comprised of the following:
 - Statutory capital and surplus;
 - Statutory liabilities that are intrinsically allocations of surplus, such as the Asset Valuation Reserve (AVR) and Interest Maintenance Reserve (IMR).
 - Statutory non-admitted assets that have realizable value such as a certain amount of the Agent Debit Balance;
 - Reduction of surplus items that represent an obligation to another party;
 - Adjustment to reflect the difference between the market value of the invested assets and the statutory carrying value included in the statutory capital and surplus;
 - Adjustment (usually a reduction) in the value of certain admitted assets that the user values differently than the reported statutory value; e.g. deferred tax asset (DTA).

10. Continued

- Adjustment in the value of certain liabilities that the user values differently than the reported statutory value, such as the claim liability or policy reserves.
- Adjustment for any tax assets or liabilities that may not be transferable in the transaction.

(ii) Value of the business in force

- Calculated as the present value of future earnings over a projection period on the business in force as of the valuation date.
- Requires that the actuary:
 - Develop a projection model
 - The model needs to reflect the complexity of the business.
 - The model should be flexible enough to easily handle sensitivity testing and manageable enough to produce results that can be explained.
 - Determine starting in force values
 - Validate the model to reproduce actual premiums, policy counts, and statutory statement reserves of the business as of the starting valuation date.
 - The projection formulas and assumptions should be consistent with the definitions of the starting values.
 - Create a specific set of assumptions that reflects reasonable expectations for the business.
 - The actuary will need to rely upon experts in some areas (e.g. investment income, expense, and new business) for developing the assumptions.
 - The key assumptions and their sources should be well documented and disclosed in the actuarial appraisal report.
 - Process these through the projection system

(iii) Value of future business capacity

- Is usually calculated as the present value of projected future after-tax earnings of new business to be issued after the valuation date.
- Oftentimes can be an estimate significantly differing between sellers and buyers.
- The number of issue years included as new business will range from 0 to 10.
- The actuary is usually provided with new business volume assumptions by management.
- Other assumptions are usually consistent with those used for the existing business, unless there is a justified reason for changing them.

10. Continued

(iv) Adjustment for the future cost of capital retained to support the business

- The business being sold will need to be supported by capital and surplus.
- The amount of capital that needs to be held is related to the types and volumes of business written by the insurance carrier.
- The cost of capital calculation includes the after-tax net investment income on the capital held, along with the annual changes in required surplus.

11. Learning Objectives:

6. Evaluate financial performance measures for insurers for both short-term and long-term products.

Learning Outcomes:

- (6a) Assess key financial measures used by various entities (insurers, HMOs, provider-owned plans).

Sources:

Analysis for Financial Management, Chapters 1 and 2, pgs. 22 and 51

ASOP #7

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Define and distinguish between Net Cash Flow, Cash Flow from Operating Activities, Free Cash Flow and Discounted Cash Flow.

Commentary on Question:

Good candidates were expected to define and distinguish the terms. Poorer candidates typically lacked distinguishing descriptions and poorer candidates defined net income and operating rather than cash flows.

Net Cash Flow = Net Income + Noncash Items

- Intended to measure the cash a business generates

Cash Flow from operating Activities = Net Cash Flow + or – changes in current assets and liabilities

- More inclusive than net cash flow because it includes changes in current assets and liabilities

Free Cash Flow = Total cash available for distribution to owners and creditors after funding all worthwhile investment activities

- Extends Cash Flow from Operating Activities by recognizing some cash must be plowed back (invested) in the business to support growth

Discounted Cash flow = A sum of money today having the same value as a future stream of cash receipts and disbursements

- Takes into account the time value of money

- (b) Evaluate the Net Cash Flow and Cash Flow from Operating Activities for Copperfield and Great Expectations for 2012. Show your work.

11. Continued

Commentary on Question:

Good candidates were expected to evaluate (not just determine a numerical answer); a brief commentary will raise awarded score. Poorer candidates resorted to calculating net income from revenues and expenses when it was already given in the case study.

Copperfield

Net Cash Flow

$$\begin{aligned} &= \$2,482\text{M} + \$265\text{M (amortization of other intangible assets)} \\ &= \$2,747\text{M} \end{aligned}$$

Cash Flow from Operating Activities

$$\begin{aligned} &= \$2,747\text{M} - (14,587\text{M} - 13,938) \text{ [change in current assets]} + ((10,052\text{M} - 345\text{M}) - \\ & \quad (9,757\text{M} - 456\text{M}) \text{ [change in current liabilities]} \end{aligned}$$

Copperfield's net cash flow and cash flow from Operating Activities differ due to the change in current assets and liabilities.

Great Expectations

Net Cash Flow

$$\begin{aligned} &= 201\text{M} + 265 \text{ (amortization)} + 131 \text{ (impairment of intangible assets)} \\ &= 597\text{M} \end{aligned}$$

Cash Flow from Operating Activities

$$= 597\text{M} - (6695 - 6346\text{M}) + (1,193 - 287)$$

Cash Flows for Copperfield are strong on both measures

Great Expectations has very low cash flow but its Cash Flow from Operating Activities is almost double.

The increase in the current portion of long term debt used some of its net cash flow.

- (c) Evaluate the Current Test for Copperfield and Great Expectations for 2012. Show your work.

Commentary on Question:

Candidates were expected to evaluate (not just determine a numerical answer); a brief commentary will raise awarded score. Poorer candidates had more difficulty calculating Copperfield Cash Flow from Operating Activities since the current and long term assets and liabilities were not separated in the case study.

11. Continued

Current Test = Current Assets / Current Liabilities

Copperfield

$$= 14,587 / (10,052 - 345)$$

$$= 1.50$$

Great Expectations

$$= 6,695 / 1,193$$

$$= 5.612$$

Great Expectations has more than 5 times the necessary amount of current assets to cover its current liabilities.

Copperfield has just over 1 times the necessary amount of current assets to cover its current liabilities.

Copperfield could potentially have liquidity issues in trying to cover its current liabilities.

- (d) According to the Actuarial Standard of Practice #7 (ASOP 7), identify situations which may indicate the need for cash flow testing.

Commentary on Question:

Poorer candidates had difficulty in retrieving the appropriate information from the ASOP and/or providing enough examples of some of the major points.

Where there is material asset risks

- Timing risks such as mortgage back securities

Where there are liabilities that have cash flows far out into the future

- Structured settlements

Where a company has a new or rapidly growing line of business

Where options have been granted to policyholders and the likelihood of anti-selection is significant

12. Learning Objectives:

7. Integrate reinsurance arrangements with overall financial strategy of company plan/sponsor.
10. Evaluate the risks associated with health insurance.

Learning Outcomes:

- (7a) Analyze the key risks that reinsurance will stabilize for a company's given line of business.
- (7b) Recommend a type of reinsurance for a given scenario.
- (10c) Complete a capital needs assessment:
 - Calculate capital needs for a given insurer
 - Assess capital needs against assets
 - Determine actions needed to address issues identified by assessment
 - Understand key elements of NAIC and Canadian RBC models

Sources:

Handbook of Employee Benefits, Chapter 30, pgs 828 and 838

Group Insurance, Chapter 19, pg. 378

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) List and describe the advantages and disadvantages of self insurance from BI's point of view.

The advantages to BI when using a self insured arrangement are:

- BI can capture favorable claims experience if its expected annual claims costs are less than similar costs in a traditional insurance arrangement.
 - This is the greatest potential source of savings.
- Reduces expenses incurred by insurer (and passed onto ER) because ER assumes financial risk.
 - This is a more reliable source of savings
 - No premium tax liability
 - No risk charge
 - No commission payments
 - General administrative and underwriting services performed by insurance company are much less
 - BI could consider internally administering the plan to further reduce costs

12. Continued

- BI can avoid state-mandated benefits.
 - For self insured arrangement, ERISA preempts state mandates
 - Especially important if BI is in multiple states where benefit mandates vary
- Greater flexibility and control in managing the benefit plan.
 - Since financial risk is assumed by BI, they are not restricted by state or federal insurance laws and are less concerned with the underlying benefit levels and cost of the health care plan
- BI can change medical plan more quickly and creatively in response to savings and quality of care opportunities.

The disadvantages to BI when using a self insured arrangement are:

- BI may be unable to accurately predict annual plan costs.
- BI may have lower costs in an insurance arrangement.
- BI would have ultimate financial responsibility for plan financial performance.
- BI would miss out on XYZ's underwriting, legal and administrative services.
- BI may have to deal with EE concerns about the financial security of their health care benefits.
- BI may have to respond to specific collective-bargaining negotiations and stipulations.
- BI would lose XYZ as a financial and administrative third-party buffer.
- BI would incur additional financial risks associated with COBRA participants.
- BI would not be able to participate in HMO's and other managed care options that are limited.

- (b) Calculate the average total annual health benefit cost for BI if they choose:

Commentary on Question:

Many candidates were confused by the mandate. A fully insured premium PMPM would include the cost of the mandate. A self insured arrangement would allow BI to avoid the state mandate, but the question explicitly tells the candidate that the mandate is to be included. As a result, the mandate should be applied to the self insured arrangement but not the fully insured arrangement.

- (i) The FI arrangement with HTI. Show your work.

$$\$850 \text{ pmpm} \times 10,000 \text{ members} \times 12 \text{ months} = \$102,000,000$$

The FI arrangement will cost BI \$102,000,000 annually.

12. Continued

- (ii) The ASO arrangement with HTI. Show your work.

Low Claims: $\$750 \text{ pmpm} \times 10,000 \text{ members} \times 12 \text{ months} = \$90,000,000$

Admin: $\$35 \text{ pmpm} \times 10,000 \text{ members} \times 12 \text{ month} = \$4,200,000$

Cost of state mandate: $2\% * \$90,000,000 = \$1,800,000$

Total cost of low claims: $\$90,000,000 + \$4,200,000 + \$1,800,000 = \$96,000,000$

Low cost compared to FI arrangement:

$\$102,000,000 - \$96,000,000 = \$6,000,000$

High Claims: $\$900 \text{ pmpm} \times 10,000 \text{ members} \times 12 \text{ months} = \$108,000,000$

Admin: $\$35 \text{ pmpm} \times 10,000 \text{ members} \times 12 \text{ month} = \$4,200,000$

Cost of state mandate: $2\% * \$108,000,000 = \$2,160,000$

Total cost of High claims: $\$108,000,000 + \$4,200,000 + \$2,160,000 = \$114,360,000$

High cost compared to FI arrangement:

$\$102,000,000 - \$114,360,000 = -\$12,360,000$

Average Claims Cost: $(\$96,000,000 + \$114,360,000) / 2 = \$105,180,000$

Average cost compared to FI arrangement:

$\$102,000,000 - \$105,180,000 = -\$3,180,000$

The cost of BI self insuring will range from \$96 million to \$114.36 million, with an average cost of \$105.18 million. This could save them up to \$6,000,000 dollars when compared to an FI arrangement, or it could cost up to an additional \$12.36 million.

- (c) Based on your answer to (a), recommend which arrangement BI should choose. Defend your answer.

Commentary on Question:

Candidates tended to focus too much on the cost and not enough on the perspective of BI. Recommending either a fully insured or self insured arrangement could net a candidate full credit if they showed a clear understanding of how BI would view each proposal.

12. Continued

Many candidates also answered this question from a purely cost driven perspective. The self insured arrangement is NOT more expensive than the fully insured arrangement and the expected cost is not the same as the actual cost. Self insured arrangements allow for a range of results; simply comparing two numbers would not be sufficient to pass this question.

BI should choose the fully insured arrangement. On average the FI proposal incurs less risk for BI, as it is expected to have a lower cost than the self insured arrangement. It also provides more stable, predictable costs. The self insured arrangement would be preferable if BI is willing to absorb a good deal of risk. But, BI can save \$6 million at most, while it could have costs of up to \$12.36 million if the claims are higher than expected.

- (d) Describe the impact to HTI's health risk based capital if BI chooses:
- (i) The FI arrangement. Show your work.
 - (ii) The ASO arrangement. Show your work.

Commentary on Question:

Candidates did particularly poorly on this question. Candidates did not understand whose risk based capital they were evaluating. Many assumed they were evaluating BI's RBC. Additionally, candidates failed to recognize that BI is not currently a customer of HTI, so BI's claims and admin fees are not included in HTI's RBC at the beginning of the problem. Many candidates provided very lean answers, losing many points for failing to explain how RBC works and why HTI's RBC was impacted.

The impact to HTI's Health RBC formula (RBCAC) depends upon the added risk.
$$RBCAC = H_0 + \sqrt{H_1^2 + H_2^2 + H_3^2 + H_4^2}$$

- H_0 = asset risk for affiliates
- H_1 = asset risk for other assets
- H_2 = underwriting risk
- H_3 = credit risk
- H_4 = business risk

The health RBC is related to the authorized control level (ACL) $\Rightarrow RBCAC = \frac{1}{2} ACL$.

Goal is to have the overall ratio of:

- Total Adjusted Capital (TAC) / Authorized Control Level > 2
- If ratio is below 2 then action may be required

12. Continued

Full Insured Arrangement

- Under a fully insured arrangement HTI's is predominately impacted by H₂ (underwriting risk). H₂ reflects the risk of having inadequate premium rates in the future due to fluctuations in claim levels.
- H₂ is the most dominant factor for health insurers.
- Overall RBCAC may increase materially due to the new business, this would increase ACL. Therefore, HTI may need to increase its TAC to ensure its TAC / ACL level stays above 2.0.

Self Insured Arrangement

- Since BI is taking on the claims responsibility there is no underwriting risk to HTI.
- Largest risk for HTI would be the business risk. The risk HTI bears is that it appropriately sets the administrative fees to cover the services rendered for BI.
- HTI's overall risk is much lower under a self insured arrangement than compared to a fully insured arrangement.
- Since business risk increases, this would also increase the overall RBCAC and ACL; however not as much as the FI arrangement.

- (e) BI is also considering an ASC funding arrangement. Describe the differences between an ASC funding arrangement as compared to an ASO funding arrangement.

Commentary on Question:

Many candidates failed to understand that the question was referring specifically to the funding mechanisms of these two arrangements

In an Administrative Services Contract (ASC), benefits are paid from the health insurer's bank account. The insurer is reimbursed by the third party (typically a large company).

In an Administrative Services Only (ASO) arrangement, benefits are paid directly from a bank account owned or funded by the third party. Alternatively, benefits are paid by the health insurer but only after receiving reimbursement from the third party.

13. Learning Objectives:

8. Evaluate the impact of taxation on company/plan sponsor financial management.

Learning Outcomes:

(8a) Assess the tax implications of benefit offerings from a plan sponsor perspective.

(8b) Explain malformations of the market generated by tax policies.

Sources:

The Handbook of Employee Benefits, Rosenbloom, J.S., Seventh Edition, 2011

- Chapter 30, Tax Exempt Trust (ASO), pgs 836 - 838

GH-C127-12: Canadian Handbook of Flexible Benefits, Section 12.4

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) The United States of America tax code recognizes a Voluntary Employee Benefit Association (VEBA).

(i) Define a VEBA.

(ii) List the requirements that a VEBA must satisfy to qualify for special tax status.

(iii) List the primary advantages and disadvantages of a VEBA.

Commentary on Question:

The solution to this part of the question is a straightforward definition of a VEBA, followed by simple lists. Since a VEBA is discussed under the heading of “Tax-Exempt Trust” in the reading material, the model definition is heavily weighted to the tax status of the VEBA

(i) A VEBA is a special tax-exempt entity that is better known as a 501(c)(9) trust. It is created to fund life, sickness, accident or other benefits to participating members and dependents. Most common benefits are medical and disability benefits for active employees, but post-retirement benefits can be funded. The VEBA operates as a separate entity with its own financial reporting.

(ii) Requirements for the special tax status:

- Eligibility limited to employees with a common bond, such as being in the same line of business or same geographic locale
- Non-discrimination requirements
- The trust **MUST** be controlled by members or trustees the members designate.

13. Continued

- Assets must be used only to pay permissible benefits, among which could be premiums, and funds cannot revert to the employer unless all plan liabilities have been satisfied.
- The VEBA must obtain IRS approval.
- The VEBA must follow regulations limiting the contributions and accumulations in the fund.

(iii) Advantages:

- Fund earnings are tax-exempt, except for earnings on retiree health care reserves.
- Standard accounting and reporting rules serve as a financial monitor of the plan for members, increasing their feeling of security of their benefits.

Disadvantages:

- Compliance requirements are difficult.
- Regulations are complex, likely requiring outside advice to comply.
- Operation and administration of the fund can be expensive.

(b) The Canada Revenue Agency recognizes a Health and Welfare Trust (H&WT).

(i) Define a H&WT.

(ii) List the requirements to qualify as a H&WT.

(iii) Describe the taxability of employer contributions, employee contributions, and the benefits paid.

Commentary on Question:

Similar to Part (a) of the question, this response should be a simple definition, followed by some lists.

(i) A H&WT is a vehicle recognized by the Canada Revenue Agency, that is sometimes used to fund one or more of the following insured benefits through a trust:

- Group sickness or accident
- Private health services plan benefits
- Group term life benefits

The H&WT usually covers employees who are under a collective bargaining agreement.

(ii) Requirements to qualify as a H&WT:

- Funds cannot revert to the employer.
- Funds can be used only for health and welfare benefits.

13. Continued

- Employer contributions are necessary and must be enforceable by the trustee.
 - accumulations in the fund.
- (iii) Tax Considerations:
- Employer contributions are deductible.
 - Employer contributions are not taxable to the employee when the contributions are made.
 - When benefits are paid, they are subject to tax in the same manner as if they had been paid outside the H&WT.
 - Net income to the trust is taxable to the trust.

14. Learning Objectives:

3. Evaluate techniques for claims and disease management.

Learning Outcomes:

- (3k) Compare methodologies for calculating chronic and non-chronic trends.

Sources:

Duncan Managing and Evaluating Healthcare Intervention Programs, Chapter 10, pgs 183 - 190

Commentary on Question:

Question was testing candidate's knowledge of the various methodologies that could be used to calculate the trend assumption used in assessing the effectiveness of a disease management program. Candidates were also given two sample populations, and asked to comment on the appropriateness of each of the trend methodologies for each group.

Solution:

- (a) List and explain each of the methods for calculating the trend to use in evaluating a disease management program.

Commentary on Question:

In part (a), many candidates responded with "chronic trend" and "non-chronic trend," missing that the question was asking about the methodologies that could be used to calculate either. Also, with the chronic vs. non-chronic responses, some candidates referenced "population trend," but they were referring to the chronic + non-chronic population of that specific group, not the insurer's entire population (or the appropriate subset).

- Group specific trend
 - Population trend
 - Uses employer's entire population (rather than specific location) or the insurer's book of business
 - Reduces variability of group-specific trend
 - Truncation method
 - Large claims can cause significant fluctuations from year to year
 - Truncate large or small claims
 - Utilization method
 - Uses number of hospital admissions or claims rather than cost
 - Not optimal since DM program might reduce severity of admission or length of stay, and this would not be captured
- (b) Evaluate the appropriateness of each of the trend methodologies to analyze the disease management programs of ABC and XYZ. Assume each plan is expected to save 15% of costs.

14. Continued

Commentary on Question:

In part (b), many candidates may have chosen one methodology that they thought was appropriate and explained their reasons why they chose it, where the question was asking for them to evaluate the appropriateness of each methodology for each of the two sample groups provided. There were therefore many points available in part (b) which few candidates received.

Because a claims distribution was provided for each sample group, and part (b) referred to an expected savings of 15%, many candidates tried to calculate the trend for the groups, or the disease management savings. There was, of course, not enough information provided to calculate either. Further, the question did not ask for anything to be calculated as standard practice is to add the phrase “show your work.”

For ABC

- Group specific trend would not be appropriate due to the low enrollment in the plan
- Population trend would be more appropriate due to the low enrollment
- Truncation method would not be appropriate because it does not dampen fluctuation very much in small groups
- Utilization method would be appropriate because the minimum group size required for credibility is smaller than when using costs

For XYZ

- Group specific trend would be appropriate since the group is so large
- Population trend could also be used, but would not recommend as group specific trend could be used
- Truncation method would be appropriate due to the large number of claims over \$100,000
- Utilization method would be appropriate but may not be required since the group is so large

15. Learning Objectives:

3. Evaluate techniques for claims and disease management.

Learning Outcomes:

- (31) Test actuarial methods for evaluating disease management savings outcomes.

Sources:

Healthcare Risk Adjustment and Predictive Modeling, Duncan, 2011

- Chapter 7 Introduction to Modeling, pgs. 113 – 114, 117, and 121 - 122

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) List and describe factors to consider when choosing a predictive model.

Commentary on Question:

The student was to demonstrate an understanding of the characteristics of a predictive model and the factors relevant to the appropriate application of the model. This section was fairly well answered. Candidates scored more points if they described as well as listed.

Type of outcome

Purposes of the analysis

Nature of the available data

Measurement units

Objectives of the project

Distribution of the outcome

- Normal vs. skewed

Functional relationship

- Linear vs. non-linear vs. flexible

Complex decision model

- Single vs. simultaneous equation

- (b) Describe rules-based and statistical-based predictive models.

Commentary on Question:

The student was to demonstrate an understanding of the difference between the two models. Students did well in describing the statistical-based model but poorly on the rules-based model.

Statistical-Based

Model should be able to capture the main relationships and predict behavior in a variety of situations and environments

Can be used to associate the likelihood of the event occurring

Uses data mining to identify and extract patterns from data

15. Continued

Rules-Based

Useful in identifying compliance with best-care practice

Cannot be used to associate the likelihood of the event occurring

- (c)
- (i) Explain NClass and MClass.
 - (ii) Calculate the predicted cost for each member. Show your work. Comment on the results.

Commentary on Question:

The student was to demonstrate an understanding of the different variables used in the application to follow. Part (i) was poorly answered although understanding was exhibited in completion of Part (ii) which was answered very well.

Nclass

- Indicates the number of therapeutic classes
- Derived variable

Mclass

- Indicates the number of condition categories (diagnoses) found in the member's medical record
- Derived variable

$$\text{Member 1} = 2 \times 126.7 + 245.60 \times 5 + .25 \times 567.35 + 786.45 \times 3 + 65.2 \times 5 + 4.3 \times 1 = 4,312.89$$

$$\text{Member 2} = 4 \times 126.7 + 245.60 \times 6 + .25 \times 3400 + 786.45 \times 1 + 65.2 \times 4 + 4.3 \times 1 = 3,881.95$$

The linear regression model appears to predict claims costs on the high side. There is not a strong correlation with the actual cost to the prior cost in the model. The sample is likely too small to properly evaluate the model.

- (d) You are concerned about the quality of the predictive model used in this analysis. Describe characteristics to consider for judging the quality of a chosen model.

Commentary on Question:

The student was to describe the elements necessary for selecting an appropriate model. This section was fairly well answered.

Parsimony

Model should introduce as few variables as necessary to capture the essence of the phenomena under study

15. Continued

Identifiability

Does not pertain to single variable, although common problem in systems of equations

Issues will result if model has more outcomes or endogenous variables than number of equations

Goodness of fit

Model is "good" if variations are explained to a high degree by the variables

Theoretical consistency

Need to look at parameter estimates for signs and magnitude

Should have a prior knowledge of relationship between variables and outcomes to determine if fit is theoretically plausible

Predictive power

A good R^2 does not imply that the model will predict well when used with another data set

Can test the predictive power with:

- Bootstrapping
- Jackknife
- Cross-validation

16. Learning Objectives:

10. Evaluate the risks associated with health insurance.

Learning Outcomes:

- (10c) Complete a capital needs assessment:
- Calculate capital needs for a given insurer
 - Assess capital needs against assets
 - Determine actions needed to address issues identified by assessment
 - Understand key elements of NAIC and Canadian RBC models

Sources:

Group Insurance, Bluhm, Fifth Edition, 2007

- Chapter 19 Risk-Based Capital Formulas, pgs. 376 - 378 and 381 - 384

Commentary on Question:

The point of this question was to identify the impact on the different elements of the Health RBC Formula that would take place when moving a portion of the expected medical claims from a Capitated environment to a Negotiated Fee Schedule.

In Part (a) most candidates understood that the greatest impact on H_2 was due to the change in the Managed Care Risk Adjustment Factor, although the majority struggled with identifying and properly applying the Claims Experience Fluctuation Risk portion of the H_2 formula ($H_2 = \text{Claims Experience Fluctuation Risk} + \text{Other Underwriting Risk}$, and $\text{Claims Experience Fluctuation Risk} = \text{Incurred Claims} \times \text{Risk Factor} \times \text{Managed Care Risk Adjustment Factor}$). A few candidates tried to measure the change to H_2 based on the entire \$2 billion in comprehensive medical claims. This made the answer much more complex since the question was asking only whether the portion moving to capitation would meet the pre-tax earnings target.

In Part (b) the majority of candidates rightly focused their attention on what may happen to the TAC-to-ACL ratio, yet most comments were generalities of whether or not the ratio would go up or down and what the ensuing regulatory action might be. Most failed to address how this would specifically affect the elements of the RBC formula that would lead to this change.

Solution:

- (a) Assume management's pre-tax earnings target is 20% of 5 times H_2 Risk Based Capital (RBC). Recommend whether or not WG should pursue this option. Justify your answer. Show your work.

$$H_2 \text{ RBC} = \text{Claims Experience Fluctuation Risk} + \text{Other Underwriting Risk}$$
$$H_2 \text{ RBC} = (\text{Incurred Claims} \times \text{Risk Factor} \times \text{Managed Care Risk Adjustment Factor}) + 0$$

16. Continued

Current H₂ RBC on Capitated Component:

Incurred Claims = \$250 million

Risk Factor = 9%

Managed Care Risk Adjustment Factor = .40

H₂ RBC = \$250 million x .09 x .40 = \$9 million

Modified H₂ RBC under Negotiated Fee Schedule:

Incurred Claims = \$250 million x (1 - 0.02) = \$245 million

Risk Factor = 9%

Managed Care Risk Adjustment Factor = .85

H₂ RBC = \$245 million x .09 x .85 = \$18.7425 million

The change in pre-tax net income is:

\$250 million - \$245 million = \$5 million

The change between the current and modified H₂ RBC is:

\$18.7425 million - \$9 million = \$9.7425 million

5 times the change in the H₂ RBC = \$48.7125 million

Earnings Target under Negotiated Fee Schedule:

\$48.7125 million x 20% = \$9.7425 million

WG should not pursue this option because the change in pre-tax net income (\$5 million) fails to meet the earnings target (\$9.7425 million) under the Negotiated Fee Schedule.

- (b) Explain any other impacts this contracting change may have on the overall TAC-to-ACL ratio.

H₁ (Asset Risk for Other Assets): Under a negotiated fee schedule, the company would hold higher assets due to unpaid claims liability, therefore, H₁ may increase slightly

H₃ (Credit Risk): Eliminating the credit risk from capitated entities would decrease H₃. May not have had credit risk if held funds on deposit or had a letter of credit.

H₄ (Business Risk): Under a negotiated fee schedule, administrative expenses would increase as the company would have to pay claims which would increase H₄ risk.

17. Learning Objectives:

1. Analyze medical quality measures and their importance to companies, plan sponsors and members.
2. Typical markets: Understands customer segments and how products are marketed to each.

Learning Outcomes:

- (1a) Describe impact of quality measures and how used by the stakeholders.
- (2d) Compare the relationship between different marketing channels and the underlying needs of the consumers.

Sources:

Managed Health Care Handbook, Kongstvedt, P.R., Fourth Edition, 2001

- Chapter 41 Sales and Marketing/The Distribution Process, pgs 798 – 804

The Handbook of Employee Benefits, Rosenbloom, J.S., Seventh Edition, 2011

- Chapter 9 Health Care Quality: Are We Getting Our Money's Worth (23)

Commentary on Question:

Part (a) asked the candidates to list the items that MCOs deliver. This list is brief and did not require detailed descriptions or explanations of the items. Parts (b) and (c) asked candidates to describe challenges MCOs face and ways to assess the quality of MCOs. These responses required not only a list of the main points, but also supporting descriptions of those items. Candidates were generally able to supply the majority of the information presented in this solution.

Solution:

- (a) List what a Managed Care Organization (MCO) delivers.

MCOs deliver:

- Client/consumer service
- Provider networks
- Preventive care programs
- Utilization management
- Value-added products and services

- (b) Describe the challenges that an MCO faces.

Challenges an MCO faces include:

- Choice-based competition when consumers are offered a choice among two or more plans
- Increasing access to information through the use of the internet
- Meeting the client/consumers' expectations of quality

17. Continued

- Setting sales goals that are in line with strategic objectives
 - Regulatory pressure has impeded an MCO's ability to manage quality and cost
 - Consolidation of MCOs
 - Increasing medical costs
- (c) Describe ways to assess the quality of an MCO.
- Look for accreditation by an independent organization such as the JCAHO or NCQA:
 - NCQA is the most experienced
 - NCQA has developed HEDIS
 - Based upon reviews and MCO performance on HEDIS and CAHPS, MCO can be granted the following levels of accreditation:
 - Excellent
 - Commendable
 - Accredited
 - Provisional
 - Denied
 - Request and review the following from the MCO:
 - Credentialing criteria for network providers
 - Documentation related to quality performance and initiatives
 - Provider quality profiles
 - Reimbursement formula for network providers
 - Preventive care programs offered and utilization rates
 - Plan-wide measures of quality
 - Plan a brief site visit:
 - Allow 4-8 hours for the visit
 - Limit time spent on marketing and formal presentations
 - Arrange to meet with key staff
 - Devote the most time to direct observation and questioning of staff
 - Discuss quality related information
 - Assess the philosophy of the MCO

18. Learning Objectives:

6. Evaluate financial performance measures for insurers for both short-term and long-term products.
10. Evaluate the risks associated with health insurance.

Learning Outcomes:

- (6a) Assess key financial measures used by various entities (insurers, HMOs, provider-owned plans).
- (6d) Compare measures for long-term and short-term products.
- (10c) Complete a capital needs assessment:
 - Calculate capital needs for a given insurer
 - Assess capital needs against assets
 - Determine actions needed to address issues identified by assessment
 - Understand key elements of NAIC and Canadian RBC models

Sources:

ASOP #7

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe why asset characteristics are important to consider in cash flow testing.

Commentary on Question:

Many candidates didn't answer the question as asked, but listed other things that were not characteristics of assets.

Asset characteristics are important to consider in cash flow testing because they convey the timing and amounts of cash flows, which need to be compared with liability and other cash flows associated with the insurance product.

The market value and cash flows of some assets will be relatively immune to external economic forces; whereas others will be more sensitive to the economy. It is important to scenario test the more sensitive assets (i.e. for different economic scenarios).

Examples of assets that are not as sensitive include:

Non-cancellable bonds

18. Continued

Examples of assets that are more sensitive include:

Stocks
Bonds
Derivatives

- (b) List the issues relating to asset characteristics that an actuary should consider in cash flow testing.

Commentary on Question:

Most candidates included “liquidity” and “volatility” in their response, for which they were able to receive partial credit, but they failed to relate these words with the broader concept.

The following issues should be considered in cash flow testing:

- Default risk/asset quality
- Cost of maintaining the asset
- Embedded options available within the asset and their timing
- Sensitivity to external economic factors such as interest rates, inflation, liquidity market risk
- Whether there are any regulatory or other restrictions on how and when the asset can be used
- Past experience of similar assets to those in portfolio

- (c) Explain the viability of investing the entire reserve in gold.

Commentary on Question:

A few candidates didn’t definitively state their opinion on the viability of investing all of the assets in gold. Rather, they listed pros and cons. Few candidates were able to identify and relate to the company having high borrowing costs. This indicates they weren’t incorporating details given in the question into their answers.

I believe it is not viable to invest the entire reserve in gold.

The cash flows related to the Long Term Care (LTC) product are completely unrelated to those of gold. Gold is a commodity whose price fluctuates significantly over time (as shown in the graph provided by the CEO), in relation to the value of the US dollar and worldwide demand; whereas the cash flows of the LTC product involve percentage of the business at a later point in time. While gold would provide some inflation protection, there is no guarantee that its value would increase to match the obligations required of the LTC coverage, and there is no promise of market value or other cash outflows with gold.

18. Continued

Investing 100% of reserves in any single asset category is not consistent with sound actuarial practices. A diversified portfolio is recommended, some of which could certainly include gold. Given the company's high cost of borrowing, it could potentially be expensive to purchase gold at key moments when its price is perceived as favorable.

The volatility of gold could result in RBC problems for the company if there was a significant downturn in the market price, which is certainly plausible looking at the last 30-40 years of actual prices.

19. Learning Objectives:

10. Evaluate the risks associated with health insurance.

Learning Outcomes:

- (10b) Evaluate an enterprise risk management (ERM) system, including:
- Describe the components on an ERM program
 - Describe ERM-type risks
 - Describe the types of analysis used to measure the risk
 - Discuss methods for mitigating the risks

Sources:

Enterprise Risk Management: From Incentives to Controls, Lam, 2003, Chapters 4, 8, and 9, pgs. 52 - 53, 101 - 102, and 113 - 114

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe the seven components of an ERM program.

Commentary on Question:

Most students provided a list with a description of most items.

Corporate governance

To ensure that the board of directors and management have established the appropriate organizational processes and corporate controls to measure and manage risk across the company.

Line management

To integrate risk management into the revenue generating activities of the company, including:

Portfolio management

To aggregate risk exposures, incorporate diversification effects, and monitor risk concentrations against established risk limits.

Risk transfer

To mitigate risk exposures that are more cost-effective to transfer out to a third party than to hold in the company's risk portfolio.

Risk analytics

To provide the risk measurement, analysis, and reporting tools to quantify the company's risk exposures as well as

19. Continued

Data and technology resources

To support the analytics and reporting processes.

Stakeholder management

To communicate and report the company's risk information to its key stakeholders.

- (b) Using the RAROC metric against the hurdle rate for the inforce blocks, evaluate the performance for each of the following:
- (i) Individual Medical. Show your work.
 - (ii) Group LTD. Show your work.
 - (iii) The company as a whole. Show your work

Commentary on Question:

Most students answered all components of this part correctly.

- (i) Individual Medical. Show your work.
RAROC = Risk-adjusted Return / Economic Capital

Risk-adjusted Return = 18.82
Economic Capital = 100
RAROC = $18.82 / 100 = 18.82\% > 15\%$
beating the hurdle rate thus creating value

- (ii) Group LTD. Show your work.
Risk-adjusted Return = 7.56
Economic Capital = 60
RAROC = $7.56 / 60 = 12.6\% < 15\%$
failing the hurdle rate and thus destroying value

- (iii) The company as a whole. Show your work
Risk-adjusted Return = $18.82 + 7.56 = 26.38$
Economic Capital = $100 + 60 = 160$
RAROC = $26.38 / 160 = 16.49\% > 15\%$
beating the hurdle rate thus creating value

- (c) Calculate the minimum number of units of new business that Group LTD needs to write in order to meet the hurdle rate. Show your work.

19. Continued

Commentary on Question:

Most students did well on this part. Most students showed the formula filled in and then they solved for the answer.

Let n be the number of units of new business.

It requires x millions economic capital, and produces $0.16n$ millions risk-adjusted returns.

The total required economic capital = $60 + n$

The total risk-adjusted returns = $7.56 + 0.16n$

$\text{RAROC} = (7.56 + 0.16n) / (60 + n)$

To meet the hurdle rate, we need $\text{RAROC} \geq 15\%$

That is, $(7.56 + 0.16n) / (60 + n) \geq 15\%$

Solve the inequality, $n \geq 144$

The minimum number of units is 144

- (d) Assess Derek Hansen's statement on risk transfer. Show your work.

Commentary on Question:

Most students did not perform the calculation portion of the question. Most students just presented the commentary portion. When a question says "show your work" that means that a mathematical calculation is part of the solution.

Since RAROC of inforce block = $18.82\% > \text{RAROC}$ of new business = 17% ,

It is true that writing new business would lower its overall RAROC .

One disadvantage of RAROC as a performance metric

Is that it does not capture the quantity of return that an activity generates.

Since RAROC of new business = $17\% > 15\%$ the hurdle rate,

Writing new business creates value to the company

It would therefore be desirable to use a metric that captures the quantity of return that a unit or activity generates in this case

51,042 = Economic income created (EIC) is a risk optimization tool that can be used as just such a metric:

$\text{EIC} = \text{Risk-adjusted return} - (\text{Hurdle rate} \times \text{economic capital})$

19. Continued

EIC is better because it encourages Business unit manager to pursue all above-hurdle, marginal growth opportunities whereas RAROC targets can have adverse effect of discouraging growth in business with historical high RAROC performance.
For each unit of new business,
Risk-adjusted return = 0.17
economic capital = 1
EIC = $0.17 - 15\% * 1 = 0.02$

- (e) Critique Mary Woodland's argument, and recommend a performance metric for measuring performance in such a situation. Show your work.

Commentary on Question:

This was a poor question and most students only presented a portion of the commentary. No one presented a discussion of EIC

Since RAROC of inforce block = 18.82% > RAROC of new business = 17%, it is true that writing new business would lower its overall RAROC is that it does not capture the quantity of return that an activity generates

Since RAROC of new business = 17% > 15% the hurdle rate, writing new business creates value to the company. It would therefore be desirable to use a metric that captures the quantity of return that a unit or activity generates in this case.

Economic income created (EIC) is a risk optimization tool that can be used as just such a metric:

For each unit of new business,

Risk-adjusted return = 0.17

Economic capital = 1

$EIC = 0.17 - 15\% * 1 = 0.02$

20. Learning Objectives:

4. Formulate and evaluate insurer claim reserving techniques.

Learning Outcomes:

- (4b) Explain the limitations and applications of the various valuation methods:
 - Lag Methods
 - Tabular Methods
 - Case Reserves
 - Projection Methods
 - Loss Ratio Methods
- (4c) Calculate appropriate claim reserves given data.
- (4e) Evaluate data resources and appropriateness for calculating reserves.

Sources:

Group Insurance, Bluhm, W. F., Fifth Edition, 2007

- Chapter 40 Short-Term Reserves, pgs. 854-861

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe the methodologies which could be used to calculate STD IBNR.

Commentary on Question:

Most candidates did well answering the Lag/Development Method (also accepted Claims Triangular Method or Completion Factor Method). Full credit could be earned only if a description was provided. Only a small number of candidates mentioned the Factor Method. Several candidates mentioned other methods such as Tabular Methods; however, given the data and the nature of the product provided, these methods are not appropriate for STD IBNR reserve calculation.

Factor Method

- Used for short lag or run-off products
- Factor applied to inforce premium or benefit volume
- Factor = Benefits paid after valuation date / Inforce statistic on valuation date

Lag/Development Method

- Split claim amount or count by incurrals and period of payment
- Summarize inforce lives or premium for same incurrals periods
- Durations should be short (monthly or quarterly)
- Assumes claim practices and other contingencies are stable through periods
- Calculate completeness ratios - % of ultimate claims received after varying months (claim triangles)

20. Continued

- (b) List the strengths and weaknesses of each method.

Commentary on Question:

Most candidates did well answering at least a few components of strengths/weaknesses of the Lag/Development Method. Only a small number of candidates mentioned the Factor Method.

Factor Method

- Easy to understand (Strength)
- Need historical data/startup issues (Weakness)
- Over-responsive to changes in inforce (Weakness)

Lag/Development Method

- Can develop different factors for EP (Strength)
- Low claim volume needed (Strength)
- Low credibility in early durations (Weakness)
- Assumes no change in claim practices (Weakness)

- (c) Calculate the STD IBNR for each method as of 9/30/2011. Show your work.

Commentary on Question:

Most candidates did well calculating the IBNR for the Lag/Development Method. Full credit was given if the 2009 or 2010 completion factor was used for the calculation rather than the average completion factor. Partial credit was given if the candidate was not able to get to the right numerical answer but demonstrated adequate knowledge of the method. Only a small number of candidates attempted the calculation for the Factor Method.

Factor Method

IBNR claims for 12/31/2009 = $.08 * 1,400,000 = 112,000$

IBNR claims for 12/31/2010 = $.08 * 2,160,000 = 172,800$

Factor formula

Life Based Factor = IBNR Claims / IF Lives

Benefit Based Factor = IBNR Claims/ IF Benefit

Premium Based Factor = IBNR Claims/ IF Premium

Claims Based Factor = IBNR Claims/ Paid claims

20. Continued

Factor calculation

	<u>2009</u>	<u>2010</u>
Per Life	\$14.55	\$16.46
% Benefit IF	2.49%	2.76%
% Premium IFE	5.60%	5.76%
% Paid Claims	8.00%	8.00%

Factor IBNR calculation

(avg. of 2009 and 2010)

	<u>Statistic</u>	<u>Factor</u>	<u>IBNR</u>
Per Life	\$11,500	\$15.50	\$178,265
% Benefit IF	\$6,850,000	\$0.03	\$179,939
% Premium IF	\$3,200,000	\$0.06	\$181,760
% Paid Claims	\$2,266,667	\$0.08	\$181,333

Lag/Development Method

Lag factor = Claims received by date/ultimate claims received

Completion Factor

	<u>2009</u>	<u>2010</u>	<u>Avg. of 2009 & 2010</u>
30 Days of Incurral	50%	55%	53%
31 to 60 Days of Incurral	75%	75%	75%
61 to 90 Days of Incurral	90%	90%	90%
91 to 120 Days of Incurral	100%	100%	100%

Expected Claims Incurred = Claims Received by Date/Completeness Factor

IBNR Claims = Expected Claims Incurred – Claims Received by Date

Sept IBNR Claims = $47/.53 - 47 = 88.6 - 47 = 41.6$

August IBNR Claims = $72/.75 - 72 = 96 - 75 = 24$

July IBNR Claims = $81/.90 - 81 = 90 - 81 = 9$

June IBNR Claims = $93/1.00 - 93 = 0$

Total IBNR = $41.6 + 24 + 9 = 74.6$ Claims

IBNR = Expected Claims * Average Cost Value

IBNR = $74.6 * 2400$ (2010 Average Claim Value) = 179,000

21. Learning Objectives:

12. Understand an actuarial appraisal.

Learning Outcomes:

(12b) Describe components of an actuarial appraisal.

(12c) Describe an approach for preparing an actuarial appraisal.

Sources:

GH-C103-07: the Actuary and Health Insurance Mergers and Acquisitions

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Comment on the (i) judgment required, (ii) general technique and (iii) output required for each of the three valuation techniques employed by investment bankers and other financial advisors to value an insurance company.

Commentary on Question:

Some candidates had trouble with part (iii). It seems that they mistook output for input.

Comparable Company Analysis

- (i) Judgment
 - Peer group large enough
 - Similar regulatory rules
 - Similar dominant segments
- (ii) General Technique
 - Compares financial statistics of selling company to comparable companies
- (iii) Output
 - Develop an implied range of values based on comparable company multiples

Comparable Transaction Analysis

- (i) Judgment
 - Transactions are of similar size, similar sectors
 - Ascertain the actual price paid by examining the deal beyond the deadline
- (ii) General Technique
 - Reviews certain financial data relating to relatively recent insurance merger transactions

21. Continued

- (iii) Output
- Develop multiples based on similar transaction

Discounted Cash Flows

- (i) Judgment
- Dividend payout rate
 - Ultimate book value date
 - Appropriate discount rate
- (ii) General Technique
- Estimated PV of future streams of after-tax cash flow
- (iii) Output
- Tangible value

(b)

Commentary on Question:

Many candidates made the mistake of using the projected pre-tax earnings rather than the pre-tax cash flows in determining the present value of the after-tax cash flows. Most candidates correctly calculated the weighted average cost of capital. The majority of candidates took the PV of after-tax cash flows as the tangible value. They did not go the extra steps of also adding to that the terminal value. When performing the sensitivity analysis on the discount rate, some candidates used the WACC +/- 1% rather than recalculating the cost of capital using the low and high ends of Purple HI's range of expected returns. When making a recommendation, candidates who not only gave a price, but also gave a range and explained other considerations, received maximum credit.

- (i) Calculate the value of the acquisition using the discounted cash flow method. Show your work.

Calculate weighted average cost of capital

$$6.75\% = 25\% * 10\% + 50\% * 7\% + 25\% * 3\%$$

Discount after-tax Cash flows = after tax cash flows discounted

Year 1	7.49	$= (10 - 1 - 1) / 1.0675$
2	7.46	$= (12 - 2 - 1.5) / 1.0675^2$
3	5.75	$= (11 - 2.5 - 1.5) / 1.0675^3$
4	5.39	$= (10 - 2 - 1) / 1.0675^4$
5	7.21	$= (12 - 1 - 1) / 1.0675^5$
Total	33.31	

Calculate terminal value = PE ratio * expected after tax earnings discounted

$$39.68 = 5 * (13 - 1 - 1) / 1.0675^5$$

Calculate Tangible Value = sum of cash flows + terminal value

$$72.99 = (7.49 + 7.46 + 5.75 + 5.39 + 7.21) + 39.68$$

21. Continued

- (ii) Describe a sensitivity analysis that you could perform on your calculation in part (i).

Show a range of discounted values that would result if discount rates were moderately increased or decreased.

- (iii) Perform a sensitivity analysis of your calculation in part (i). Show your work.

1. Calculate tangible value while discounting at LOW return rather than expected return

Calculate weighted average cost of capital using LOW return

$$5.25\% = 25\% * 8\% + 50\% * 5.5\% + 25\% * 2\%$$

Discount after-tax Cash flows = after tax cash flows discounted

Year 1	7.60	= (10 - 1 - 1) / 1.0525
2	7.67	= (12 - 2 - 1.5) / 1.0525 ^ 2
3	6.00	= (11 - 2.5 - 1.5) / 1.0525 ^ 3
4	5.70	= (10 - 2 - 1) / 1.0525 ^ 4
5	7.74	= (12 - 1 - 1) / 1.0525 ^ 5

Total 34.73

Calculate terminal value = PE Ratio * expected after tax earnings discounted

$$42.58 = 5 * (13 - 1 - 1) / 1.0525 ^ 5$$

Calculate Tangible Value = sum of cash flows + terminal value

$$77.31 = (7.60 + 7.67 + 6.00 + 5.70 + 7.74) + 42.58$$

2. Calculate tangible value while discounting at HIGH return rather than expected return

Calculate weighted average cost of capital using HIGH return

$$8.25\% = 25\% * 12\% + 50\% * 8.5\% + 25\% * 4\%$$

Discount after-tax Cash flows = after tax cash flows discounted

Year 1	7.39	= (10 - 1 - 1) / 1.0825
2	7.25	= (12 - 2 - 1.5) / 1.0825 ^ 2
3	5.52	= (11 - 2.5 - 1.5) / 1.0825 ^ 3
4	5.10	= (10 - 2 - 1) / 1.0825 ^ 4
5	6.73	= (12 - 1 - 1) / 1.0825 ^ 5

Total 31.99

21. Continued

Calculate terminal value = PE Ratio * expected after tax earnings discounted

$$37.0 = 5 * (13 - 1 - 1) / 1.0825^5$$

Calculate Tangible Value = sum of cash flows + terminal value

$$68.99 = (7.39 + 7.25 + 5.52 + 5.10 + 6.73) + 37.0$$

- (iv) Recommend the price Purple HI should pay to acquire Pink HI. Justify your answer.

The expected tangible value is 72.99 using the expected rate of return. The candidate's choice should be within the range of possible tangible values of 68.99 and 77.3 (using the high and low WACC). (e.g. to max of 10% of surplus or 100% of prior years' earnings)

22. Learning Objectives:

8. Evaluate the impact of taxation on company/plan sponsor financial management.
9. Evaluate the impact of regulation on company/plan sponsor financial management.

Learning Outcomes:

- (8a) Assess the tax implications of benefit offerings from a plan sponsor perspective.
- (9b) Compare the primary federal regulations with which an employer must comply when offering benefit plans.

Sources:

GH-C125-12: Canadian Handbook of Flexible Benefits, Chapter 13, pages 279-281

Group Insurance, Bluhm, W. F., Fifth Edition, 2007

- Chapter 16 Regulation in Canada , pgs. 320 - 323

GH-C124-12: CIA Study Note Taxation of Employee Benefits (Group Insurance) in Canada, pages 3-10

Commentary on Question:

Candidates did very well on answering all parts of this question.

Solution:

- (a) Explain the following Canadian anti-discrimination regulations:
 - (i) Equal pay for equal work
 - It is not legal to discriminate based on gender in compensation (pay and benefits) for the same job.
 - An employer cannot provide different salary based on race, sex, age and marital status.
 - Two jobs are considered the same if they are substantially the same in terms of skills, responsibilities, working conditions and effort.
 - (ii) Pay equity
 - It goes beyond (i). Employer cannot provide different compensation (pay and benefits) if two jobs are of equal value (even if different role or occupation).
 - This protects those in traditionally undervalued female-dominated jobs.

22. Continued

- (iii) Employment equity
- Employers should work to remove barriers to increase the representation of females, visible minorities, people with disabilities and aboriginal persons within their workplace.
 - Should be taken into consideration when developing group benefit plans.

- (b) Define the Canadian tax treatment of group insurance benefits from a Canadian employee point-of-view.

In general, the Canadian tax treatment says if an employer takes a deduction then the employee has to pay a tax on employer contribution with some exceptions due to a tax break.

	Employer contribution taxable to employee?	Benefit paid taxable to employee?
Group Term Life	Taxable	Not Taxable
Death Benefit Paid by the Employer	N/A	The first 10k is tax free if the spouse is the beneficiary
Survivor Income Benefit (SIB)	Taxable	Capital portion is not taxed Interest portion is taxed
Accidental Death & Dismemberment (AD&D)	Not Taxable	Not Taxable
Group Disability Income (STD and LTD)	Not Taxable	Taxable if employer contribute, Not-taxable if employees pay-all
Group Health and Dental	Not Taxable	Not Taxable

- (c) List and briefly describe Canadian government programs for which Canadian companies' contributions are based on employee wages.

Employment Insurance (EI)

- Administered by the Federal government
- Both employers and employees contribute
- Benefits include:
 - Employment benefit
 - Sickness benefit
 - Maternity benefit
 - Parental benefit (Also include adoption)
 - Compassionate benefit

22. Continued

- Supplemental Unemployment Benefit (SUB)
- 55% of salary, maximum \$423 per week
- The number of weeks covered varies by type of benefit
- Need to have worked a minimum number of hours within the last 52 weeks

Worker's Compensation (WC)

- Administered by each province
- Private insurers are not involved
- Only employer contributions
- Mandatory coverage
- Benefits include:
 - Loss of income payments, STD and LTD benefits are reduced by WC benefits
 - Death benefits
 - Medical benefits

Canada/Quebec Pension Plan (C/QPP)

- Employees and employer make matching contributions, 4.95% of salary
- Benefits include:
 - Retirement benefit
 - Disability benefit
 - Death benefits
 - Surviving benefits