GH FVU Model Solutions
Spring 2022

1.

Learning Objectives:
1. The candidate will understand and apply valuation principles for insurance contracts.

Learning Outcomes:
(1c) Calculate appropriate claim reserves given data.

(1g) Apply applicable standards of practice related to reserving.

Sources:
Actuarial Standard of Practice No. 23

GHFV-103-16-Health Reserves

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a) Describe the considerations regarding the quality of data to be used for reserving according to Actuarial Standard of Practice No. 23.

Commentary on Question:
To receive full credit, candidates needed to make at least one statement describing data quality related to reserving. Credit was awarded for descriptions not identified in the list below. Most candidates described several considerations relating generally to data quality but nothing specific to reserving, and therefore only received partial credit. No credit was given for responses that only listed key terms.

- Actuaries should use data that is appropriate to the work being performed.
- The data should be reviewed for general reasonableness and consistency, but the review does not need to be an audit.
- The actuary should disclose any reliance on others who reviewed the data.
- For claims reserves, the review and documentation should address the reconciliation of paid claims against the general ledger. Proper reserve estimates should include some attempt to account for all paid claims related to a line of business.

1. Continued

(b)   Describe the considerations when setting initial lag factors for the age-to-age development method.

Commentary on Question:
Candidates did not perform well on this question. Many candidates listed general considerations for using the development method, and not specifically for setting the initial lag factor. Some candidates received partial credit for generally describing the twofold test.

- In a simple model, pick the duration at which all claims are expected to be complete and set at 1.000 (fully complete). Divide age-to-age development backward to get completion factors.
- It is possible to set the last lag factor to something less than 1.000 if residual claims may still develop.
- Consider whether completion factors can be set greater than 1.000. This means that we expect to have a negative liability, and the expected runout will be recoveries.
- The test for setting completion factors greater than 1.000 is twofold:
  - Consider whether the pattern is consistent historically.
  - Consider whether there are any changes in business practices or provider contracts to suggest the pattern will continue going forward

(c)   Calculate the IBNR estimate as of 12/31/2021. Show your work.

Commentary on Question:
For the months using the development method, most candidates received partial credit for setting up the reserve calculation correctly even if they did not calculate the smoothed six-month average lag factor or completion factors correctly. A common mistake was to use an earlier time period to calculate the six-month average factors, instead of the most recent months, or to set lag 11 at 1.0 instead of lag 12 when determining the completion factor.

For the month using the projection method, few candidates received full credit because most did not trend the PMPM correctly. Several candidates did not use the correct experience period to determine the PMPM or used the sum of the entire triangle instead of the ultimate value. However, most candidates received at least partial credit for calculating a PMPM and applying it correctly in the reserve calculation.

Candidates also received points for appropriately identifying which months should use the projection method instead of the development method based on their completion factors, even if those factors were not correct.

1. Continued

To calculate the IBNR, candidates had to perform the following steps:
- Step 1: Calculate the age-to-age development factors by dividing the adjacent cells in the claims triangle.

Incurred Month	Month Lag 0	1	2	3	4	5	6	7	8	9	10	11	12
June-20	23.51	1.46	1.05	1.02	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00
July-20	30.27	1.29	1.08	1.08	1.02	1.01	1.00	1.00	1.01	1.00	1.00	1.00	1.00
August-20	9.28	1.40	1.06	1.03	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00
September-20	47.12	1.13	1.04	1.02	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
October-20	5.75	1.44	1.12	1.03	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
November-20	22.29	1.30	1.03	1.01	1.01	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00
December-20	14.91	1.21	1.04	1.05	1.01	1.04	1.00	1.00	1.01	1.01	1.00	1.00	
January-21	10.90	1.50	1.07	1.05	1.03	1.00	1.01	1.01	1.01	1.00	1.00		
February-21	15.82	1.57	1.09	1.02	1.02	1.00	1.01	1.00	1.00	1.00			
March-21	9.23	1.48	1.03	1.01	1.03	1.01	1.00	1.00	1.00				
April-21	20.73	1.28	1.03	1.06	1.01	1.00	1.01	1.00					
May-21	17.03	1.20	1.07	1.02	1.01	1.01	1.00						
June-21	16.51	1.59	1.03	1.01	1.00	1.00							
July-21	23.11	1.25	1.11	1.02	1.01								
August-21	14.52	1.37	1.04	1.08									
September-21	11.23	1.14	1.07										
October-21	4.83	1.69											
November-21	21.94												
December-21													

- Step 2: Calculate the smoothed age-to-age factors by averaging the most recent 6 months of data.
- Step 3: Calculate the completion factors (CF). Since the problem states that all claims are complete after 12 months, set the CF for lag month 12 at 1.00. Then calculate the lag month 11 CF by dividing the lag month 12 CF by month 11 lag factor.
- Step 4: Identify months with <30% completion, which need to use the projection method to estimate reserves.

Lag Month	0	1	2	3	4	5	6	7	8	9	10	11	12
Lag Factor (6 Mo Avg)	15.356	1.374	1.057	1.031	1.014	1.005	1.005	1.003	1.002	1.003	1.001	1.001	1.000
Completion Factor	4.2%	64.5%	88.7%	93.8%	96.7%	98.1%	98.6%	99.1%	99.4%	99.6%	99.9%	99.9%	**100.0%**
Projection Method Required?	Yes	No	No	No	No	No	No	No	No	No	No	No	No

- Step 5: Calculate the trended PMPM to use for the projection method. Start by using 1/2019-12/2020 experience to calculate a PMPM. Then trend the PMPM for 23.5 months (trending mid-point of experience period to mid-point of reserve estimate month; i.e., 1/1/2020 to 12/15/2021).

2019-2020 Claims	$42,872,648
2019-2020 Members	276,327
PMPM	**$155.15**
Trend at 10% for 23.5 months	
Trended PMPM	**$186.99**

1. **Continued**

- Step 6: Calculate reserves using the appropriate method for each month.
    - o For months that are at least 30% complete, divide the claims paid to date by the completion factor to determine the incurred claims.
    - o For months that are less than 30% complete, multiply the trended PMPM by the membership to determine the incurred claims.
    - o Subtract the claims paid to date from the incurred claims to determine the IBNR.

Incurred Month	Members	Claims Paid to Date	Months that are 30% or more complete			Months that are less than 30% complete		Selected Method	
			Lag Month	Completion Factor	Incurred Claims	Trended PMPM	Incurred Claims	Incurred Claims	IBNR
January-21	12,227	$2,548,319	11	99.9%	$2,549,802			$2,549,802	$1,482
February-21	12,201	$2,187,520	10	99.9%	$2,190,341			$2,190,341	$2,821
March-21	12,130	$2,361,225	9	99.6%	$2,370,435			$2,370,435	$9,209
April-21	11,986	$2,237,437	8	99.4%	$2,251,387			$2,251,387	$13,950
May-21	11,927	$2,385,024	7	99.1%	$2,406,479			$2,406,479	$21,455
June-21	11,814	$2,196,919	6	98.6%	$2,228,197			$2,228,197	$31,278
July-21	11,787	$2,502,042	5	98.1%	$2,550,951			$2,550,951	$48,909
August-21	11,689	$2,466,086	4	96.7%	$2,550,060			$2,550,060	$83,974
September-21	11,731	$2,688,921	3	93.8%	$2,867,962			$2,867,962	$179,041
October-21	11,843	$2,193,388	2	88.7%	$2,473,189			$2,473,189	$279,802
November-21	11,902	$1,283,817	1	64.5%	$1,989,471			$1,989,471	$705,654
December-21	11,844	$96,378	0	4.2%		$186.99	$2,214,706	$2,214,706	$2,118,328
Total IBNR as of December 2021									**$3,495,902**

2.

Learning Objectives:

1. The candidate will understand and apply valuation principles for insurance contracts.

Learning Outcomes:

(1a) Describe the types of claim reserves (e.g., due and unpaid, ICOS, IBNR, LAE, PVANYD).

(1c) Calculate appropriate claim reserves given data.

Sources:

Group Insurance, 8th Edition, Ch. 39 and 40

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a)

    (i) Critique the accuracy of your direct report's calculated pending reserve using your own estimate from the continuance table provided. Show your work.

Claim Duration (months)	Age 40 at Claim
0	1000
1	960
2	920
3	880
4	845
5	815
6	790
7	765
8	745
9	725
10	0

    You receive a follow-up email from your direct report.

> *Hi, it turns out I had it backwards on when we were informed of the claim. Rather than one month after the end of the elimination period, it's supposed to be one month before the end of the elimination period. Sorry about that!*

    (ii) Evaluate how the pending reserves may change based on the follow-up email.

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2.   Continued

Commentary on Question:
Part (i) was very well answered by most candidates. Where most candidates went wrong, they didn't assume payments occurred mid-point. Points were still provided if their assumptions for beginning or end of month were clearly stated. Some candidates forgot to provide critique on the analyst's results after performing the calculations. Some candidates did not properly use the continuance factors at time 4, but rather another time period. Some candidates confused the pending reserve with the tabular reserves.

For Part (ii), most candidates had a good understanding as to the impact this change would have on the pending reserve. Some candidates provided contradictory statements without explicitly stating the impact on the pending reserve.

SOLUTION
(i)   First, calculate tabular reserve

Claim Duration (months)	Age 40 at Claim	Midpoint	Number of Months	Discounting Factor	Payment	Reserve by Duration
0	1000					
1	960					
2	920					
3	880					
4	845					
5	815	830.0	-0.0417	0.9984	$1,000	$980.64
6	790	802.5	-0.1250	0.9951	$1,000	$945.06
7	765	777.5	-0.2083	0.9919	$1,000	$912.63
8	745	755.0	-0.2917	0.9886	$1,000	$883.33
9	725	735.0	-0.3750	0.9854	$1,000	$857.12
10	0					
				Total Tabular Reserve =		$4,578.79

Discount Factor	60%
Accumulated Benefit	$1,000

Pending Reserve	$3,347.27

The pending reserve the direct report calculated seems to be too light. The pending reserve should be equal to the tabular reserve plus any benefits already due before we were made aware of the claim.

For pending claims that have completed the elimination period, the claim reserve may be computed as the product of the pending factor and the sum of (a) the tabular reserve at the current claim distribution, and (b) the accumulated value of past claim payments that have not yet been made since the claim is not yet approved.

2. **Continued**

For pending claims that are still in the elimination period, the claim reserve may be computed as the product of the pending factor and the tabular claim reserve at the end of the elimination period.
The correction means that the pending reserve comes down, as there are not yet any accumulated claims to pay out.

(b)

(i) Describe each consideration listed in the table above.:

(ii) Critique the accuracy of each row in the table above.

Commentary on Question:
In general, Part (i) was well answered. Insurance characteristics in particular was not answered very well. In some cases, the descriptions were repetitive and didn't clearly outline the consideration itself.

In general, Part (ii) was not very well answered. Most candidates thought all considerations impacted both long term and short term reserves, without going into detail or providing support. Some candidates only stated a true/false without supporting arguments. Some candidates only called out what was wrong in the table, without confirming the correct elements of the table.

(i) FALSE, seasonality is a short term consideration. Claims may increase or decrease significantly at various times of the year.

(ii) TRUE, internal company practices are a short term consideration. Fluctuating payment patterns can be caused by staffing practices and staffing events (vacations, layoffs, unusual weather), changes in computer systems, and other company specific practices.

(iii) FALSE, economic conditions are a short term consideration. Recessions will affect claims for elective treatments but cause an increase in incidences and durations of claim where people fear the loss of coverage.

(iv) TRUE, Claim Expenses are a short term consideration. However, they are also a long term consideration. Short Term – Accounting standards require recognition of a liability for the administrative expenses related to the incurred but not paid claims. Long Term – Insurers must also make provision for the expenses related to the management and payment of claims.

2. Continued

        (v)   FALSE, reserve cells are a short term consideration. For medical benefits, reserves for hospital benefits may be estimated separately from those for physician benefits. Can be set up by group size, by medically underwritten vs guaranteed issue, by over 65 vs under 65, by deductible size, by network, or by region.

        (vi)   TRUE, policy provisions are both short term and long term considerations. Short Term – The types of benefits, utilization incentives, or disincentives, claim sizes in general, and other policy provisions, can dramatically affect the pattern of claim payments. One must consider the frequency of claim payment, as well as the severity of claims. Long Term – Inclusions such as COLA, Partial and Residual Benefits, Survivor Benefits, Benefit Integration, Benefit Limitation, Waiver of Premium, Non-Level Daily Benefits.

        (vii)   FALSE, data integrity is both short term and long term consideration. Unlike the aggregate reserves computed for short-term health benefits, tabular reserves for long-term benefits are heavily dependent on the underlying seriatim claim data. Regular audits should be performed.

        (viii)   FALSE, insurance characteristics are a short term consideration. In general, new plans will typically have long lags initially, but will typically become shorter after the initial period after issue has passed. Severity of claims may also impact lag.

(c)   List and describe considerations of short term and long term reserves not identified above.

Commentary on Question:
Several candidates provided a list of considerations without describing. Several candidates restated considerations that were outlined in the earlier question, without providing new considerations. Very few candidates answered this portion strongly. Additional credit was awarded for relevant answers not identified in the list below.

Short Term Considerations
- Controls and Reconciliation – Ensure the data being used by the actuary reconciles and is consistent with the data and reporting practices used by the accounting department.
- External Influences – Environmental influences like epidemics, governmental mandates, new laws.

2. **Continued**

Long Term Considerations
- Morbidity Assumptions – The determination of the appropriate morbidity basis (continuance table) depends on the type of benefit being reserved, and on the purpose for which the reserves are being computed.
- Interest Rates – Rates for statutory reserves are generally specified by law. Rates for GAAP reserves are generally equal to a company's expected investment income rate on the assets backing its claim reserves.

3.   **Learning Objectives:**
1.   The candidate will understand and apply valuation principles for insurance contracts.

Learning Outcomes:
(1b)   Explain the limitations and biases of the traditional valuation methods.

(1c)   Calculate appropriate claim reserves given data.

(1e)   Evaluate data resources and appropriateness for calculating reserves.

Sources:
CIA Educational Note – Valuation of Group Life and Health Policy Liabilities

Commentary on Question:
The responses that were sought after in this question included lists, descriptions, calculations, and assessments. In general, candidates are reminded to be cognizant of the differences between these qualifiers. With this said, candidates generally fared well with this question from an overall standpoint. Additional commentary is provided below.

Solution:
(a)   Describe challenges facing actuaries valuing Group health and disability business.

   Commentary on Question:
   Candidates generally fared well with this question, but are reminded to remain cognizant of the difference between questions that ask to "list" versus questions that ask to "describe." While the model solution includes items that appear in the syllabus, candidates were equally rewarded for describing other valid challenges facing actuaries valuing Group health and disability business, for example with regards to challenges in appraising GH&D insurance carriers.

   The following challenges face actuaries valuing Group health and disability business:

   1. Group insurance encompasses employer group, association, creditor and what in some companies is referred to as "special risks", which is typically a form of group insurance with emphasis on accidental injury and death. Contract features, underwriting and claims experience, reporting systems, compensation and other expenses, benefit provisions and reinsurance will usually differ among these different lines.

   2. There is a wide variety of benefits and financial arrangements.

3. **Continued**

3. For groups beyond a certain size, contracts are usually the result of negotiation and thus involve customization to meet the client's specific needs. This customization creates additional complexity in the valuation. Valuing the liabilities for these policies requires familiarity with the specific contract terms. There may be a main contract and one or more side agreements, usually for refund accounting. Sometimes, the documentation of these agreements is poor. Terminology varies greatly.

4. Third party administrators (TPAs) are common and their record keeping and administration practices do not always meet the actuary's needs.

5. Large groups are commonly subject to refund accounting, which adds an additional degree of complexity to the valuation work. Because the actuary's valuation is prospective in nature, the liability for future experience rating refunds reflects the refund accounting rules or bases, and may not be simply equal to the group's surplus at the valuation date. This is particularly true where the statutory and policyholder valuation bases differ.

6. There is a wide variety of benefit types, contract provisions and rating practices. Reliable and consistent experience data are often scarce.

7. While group contracts are traditionally of a short-term nature, the term of the liability for some of these coverages would be determined on a seriatim basis and related to the ages or lifetimes of the individual participants, similar to individual insurance.

8. There are often data issues affecting the valuation of group life and health plans.

(b)

  (i) Define the Canadian Asset Liability Method (CALM).

  (ii) Explain the link between CALM policy liabilities and the accounting value of the supporting assets.

Commentary on Question:
Being a two-part question worth one exam point, responses were intended to be simple, direct, and – most importantly – answer the question. For example, while many candidates provided very detailed technical responses to part (i), only a minority of candidates actually provided the definition of CALM as a method of valuation for Canadian group life and health policy liabilities.

3. Continued

(i) The Canadian Asset Liability Method is the appropriate method of valuation for group life and health policy liabilities. The amount of policy liabilities under CALM is equal to the amount of supporting assets at the balance sheet date that are forecasted to reduce to zero at the last liability cash flow.

(ii) The link between CALM policy liability and the accounting value of supporting assets means that a change to the accounting value of the assets would be balanced by a corresponding change in the value of the liabilities, provided that the asset and liability cash flows are well matched.

(c) List factors to consider for setting termination rate assumptions for Group Long Term Disability (LTD).

Commentary on Question:
Candidates generally fared well on this question. Some candidates, however, mistakenly listed considerations in conducting Group LTD actual-to-expected termination experience studies, e.g. ensuring the removal of settled claims from the data, which is different from "setting termination rate assumptions." With this said, similar to part (a), other valid responses were equally rewarded. In order to get full credits, candidates only needed to list 4 valid items. Additional credit was awarded for relevant items not identified in the list below. Reminding candidates again to pay heed to verb phrases (in this case "list") and not waste valuable exam time providing detailed descriptions of items.

- Changes in the level of benefits provided
- Changes in claims administration practices
- COLA benefits
- Changes in government plan definition of disability

(d) Calculate the gain/loss by duration and in total. Show your work.

Commentary on Question:
Candidates generally fared well on this question. While most candidates calculated the gain/loss by extrapolating the 1/1/2021 reserves to 12/31/2021 and then comparing to actual as indicated in the model solution below, some candidates back-projected the 12/31/2021 reserves to 1/1/2021 and compared to actual at that point-in-time instead. While the calculation of the gain/loss at 12/31/2021 should be implied, the question did not specify this, and so candidates who back-projected to 1/1/2021 were not deducted exam points.

3. **Continued**

The most common technical error from candidates was the incorrect application of interest on payments (if interest was applied at all). With this said, the use of simple interest or compound interest were equally acceptable. Furthermore, many candidates performed a gain/loss calculation on the "current year" – despite the 1/1/2021 reserve being labelled as not applicable. Candidates who performed this calculation, but failed to state the assumption of a $0 reserve, did not receive full exam points.

At claim duration 11, the gain/loss is calculated as:
a. Reserve at 1/1/2021: $281,000
b. Benefits payments for 2021: $48,000
c. Interest for 2021: 2.00% * ($281,000 - $48,000 * 0.5) = $5,140
d. Expected reserve at 12/31/2021 (a. – b. + c.) = $238,140
e. Actual reserve at 12/31/2021 = $241,000
f. Gain/Loss (d. – e.) = Loss of $2,860 (i.e. actual reserve was $2,860 higher than expected)

A similar calculation would be performed for every other duration, leading to a final result summarized as follows:

Claim duration	Reserve at 12/31/2021 (expected)	Reserve at 12/31/2021 (actual)	(Loss)/Gain
11	$238,140	$241,000	($2,860)
10	$59,290	$62,000	($2,710)
9	$65,430	$67,000	($1,570)
8	$68,500	$73,000	($4,500)
7	$76,690	$80,000	($3,310)
6	$97,080	$99,000	($1,920)
5	$106,240	$102,000	$4,240
4	$119,520	$117,000	$2,520
3	$149,150	$146,000	$3,150
2	$183,980	$172,000	$11,980
1	$230,100	$219,000	$11,100
Total	**$1,394,120**	**$1,378,000**	**$16,120**

(e) Assess the adequacy of the reserve as of 2021-12-31. Justify your answer.

Commentary on Question:
While almost all candidates received credit for this question, the scores varied widely. Candidates who simply looked at the overall gain/loss from part (d) and concluded "adequate" or "not adequate" were not provided with full marks. Candidates who supplemented their response with additional observations, such as the differences by duration, and suggestions for actions to further investigate those observations were provided with full marks.

3. **Continued**

The reserve for the overall block is adequate as of 12/31/2021, as there is a gain of $16,120. However, as there appear to be gains at early durations followed by losses at later durations, this may be indicative of termination assumptions that are too aggressive at the longer durations and not aggressive enough at earlier durations. I would suggest performing a termination study to bring future gain//loss activity closer to $0, regardless of duration.

4.   **Learning Objectives:**
1.   The candidate will understand and apply valuation principles for insurance
        contracts.

Learning Outcomes:
(1c)   Calculate appropriate claim reserves given data.

(1d)   Reflect environmental factors in reserve calculations (trend, seasonality, claims
        processing changes, etc.).

(1f)   Describe, calculate and evaluate non-claim reserves and explain when each is
        required

Sources:
GHFV-103-16-Health Reserves

Individual Health Chapter 6

Commentary on Question:
*Many candidates did quite well in identifying ways to incorporate conservatism into
IBNR reserves but needed to better apply knowledge correctly to the scenario provided.*

Solution:
(a)   Describe three different ways to incorporate conservatism into Incurred But Not
        Reported (IBNR) estimates.

        Commentary on Question:
        *Candidates generally did well on this part of the question. Additional credit may
        be earned for relevant descriptions not identified in the list below.*

        • Implicit Conservatism
          o Apply actuarial judgement within the IBNR calculation to reflect higher
            than normal claim costs in the most recent months due to the lice outbreak.
        • Explicit Conservatism
          o Apply an additional percentage load to the IBNR to account for the
            additional uncertainty due the lice outbreak. This would be above any
            normal explicit conservatism that is applied each period.
        • Case Reserve
          o Establish a fixed dollar amount reserve outside the normal IBNR which is
            calculated by taking the number of expected incurred lice claims times the
            average amount paid minus the claims paid to date.

4. **Continued**

(b) Recommend which method from (a) FIC should use for the ACA business. Justify your answer.

Commentary on Question:
Candidates generally did well in selecting a method for incorporating conservatism and justifying why. Additional credit may be awarded for recommendations not identified in the list below.

A Case Reserve should be used since it can be established outside the normal IBNR process and easily tracked and explained to regulators and auditors. I would recommend that this case reserve be calculated as [number of members < 18] x [infection rate assumption] x [avg claim cost]. FIC can quantify the number of its current members who are less than 18 years old, and historical industry trend (or other credible resources) could be used it help set the infection rate as the average claim cost.

(c) Calculate the Premium Deficiency Reserve (PDR) that should be recorded at 12/31/Year 2. Show your work.

Commentary on Question:
Many candidates failed to annualize numbers or incorporate salaries into the calculation.

PDR for 12/31/2021 is based on the 2022 forecast

PDR = Claims + Expenses – Premium

PDR = [Claims PMPM] * Members*12 +[Marketing Expense PMPM] * Members*12+ [Claims Department PMPM] * Members *12 + Salaries – [Premium PMPM] * Members *12

PDR = $513*215,000*12 + $52* 215,000*12 + $26* 215,000*12 + $67,080,000 -$626* 215,000*12
= ($23,220,000)

A PDR less than 0 means no PDR is needed.

Recorded PDR at 12/31/2021 = $0

4. **Continued**

    (d)   Recommend any conservatism FIC needs to include in each of the following reserves for the Accident business because of the lice outbreak. Justify your answer.

        (i)   IBNR

        (ii)   Contract Reserves

Commentary on Question:
Many candidates identified that a lice outbreak would not affect accident claims and that employees working from home would also reduce accidents. Very few candidates correctly identified the underlying GAAP Accounting rules applicable to Contract Reserves. Additional credit may be awarded for relevant items not identified in the list below.

(i)
- The lice outbreak is not very likely to impact accident claims since accident benefits typically do not relate to medical conditions like lice.
- Because parents are transitioning to working from home, FIC's claims department might be experiencing a slowdown of claims processing.

(ii)
- Under GAAP accounting, assumptions used for Contract Reserves (e.g. ALR) are 'locked-in' at issue and cannot be changed unless a loss event occurs. The lice outbreak is not going to lead to a higher frequency of Accident claims. Thus, no changes can be made to the ALR assumptions of policies issued in prior year.
- The lice outbreak is likely to be short-term in nature whereas the assumptions used in ALR calculations are meant to capture the long-term view of future claims.

    (e)   Compare and contrast how this outbreak affects the reserves held for the ACA and Accident blocks of business.

Commentary on Question:
Candidates did better on identifying differences rather than similarities between the reserves under each block of business; however, many individuals were able to identify the impact to both ACA and Accident reserves. Additional credit may be awarded for relevant commentary not identified in the list below.

4.   **Continued**

Similarities
- Both ACA and Accident business could be impacted by slow-downs in the claims department (due to parents working from home) and as a result, both blocks could hold an additional pending claims / inventory reserve associated with the IBNR.
- The contract reserves for both the ACA and Accident business would not change. Given the long-term nature of contract reserves, the short-time impact of the lice outbreak would not impact the Accident ALR assumptions. Similarly, given the short-term nature of the ACA contract, contract reserves are typically not held (e.g. ALR = $0) and that would not change even with a lice outbreak since the outbreak would not change the terms of the ACA contract.

Differences
- The lice outbreak will likely lead to more claims under the ACA business whereas it would not increase accident claims. As a result, the IBNR for the ACA business would increase as a whole whereas the IBNR for Accident business would not be directly impacted.
- The lice outbreak could entice more families to purchases ACA coverage; as a result, the overall size of actuarial balances (like IBNR) would increase due to more members. Because lice are not covered by typical Accident policies, there will not be a similar growth expected in Accident membership or Accident actuarial balances.

5. **Learning Objectives:**
2.   The candidate will understand an actuarial appraisal.

Learning Outcomes:
(2a)   Differentiate the components of an actuarial appraisal versus an embedded value.

(2b)   Describe an approach for preparing an actuarial appraisal.

(2c)   Describe risks associated with interpreting an actuarial appraisal and an embedded value.

(2d)   Differentiate traditional, European, and market-consistent embedded value.

(2f)   Calculate an embedded value

(2g)   Apply applicable Actuarial Standards of Practice.

Sources:
Embedded Value_ Practice and Theory

GHFV-133-19-Simple Embedded Value Example

ASOP 19 - Appraisals of Casualty, Health, and Life Insurance Businesses

Commentary on Question:
Candidate did pretty well in part A, and part c, part d.
For Part B, candidate need to provide comments on economical and non economical assumptions to maximize scores.
And for part e, candidate need to answer the question by providing different options to maximize scores.

Solution:
(a)   Describe the basic components of Embedded Value (EV).

   Commentary on Question:
   None provided

   - EV are adjusted net worth (ANW) and in-force business value (IBV). EV = ANW + IBV
   - ANW = realizable value of capital and surplus
   - IBV = present value of after-tax statutory book profits (PVBP) - present value of the cost of capital (PVCoC)

5. Continued

(b) Describe the main types of assumptions used in EV calculations.

Commentary on Question:
Candidates need to describe economic and non-economic assumptions to maximize scores. Additional credit was awarded for relevant descriptions not identified in the list below.

Non-Economic Assumptions
- Policy holder behavior, Mortality
- Should be "best estimates"
- Reflect historical experience and extrapolation
- May use own and industry experience

Economic Assumptions
- Investment returns
- Discount rates
- Should be "best estimates"
- Reflect historical experience and extrapolation

(c) Assess the EV figure provided by your team. State any assumptions and show your work.

Commentary on Question:
None provided.

Time	(A) Premium	(B) = (A) * LICAT MCCSR/LICAT	(C) = (B) * Capital Target Capital	(D) = (C)$_{t-1}$ * Target Profit - (E) PT Target Profit	(E) = (C)$_{t-1}$ * Exp Earnings * (1 - Tax) PT Interest	(F) = (C)$_{t-1}$ - (C) + (E) Capital Cashflow	(G) Discount	(H) = (F) * (G) Discounted Capital Cashflow	(I) = (D) * (G) Post-tax target Profit		
0	12,000	1,080	1,890							Premium	12,000
1	11,194	1,007	1,763	208	56.70	184	0.9050	166.25	188.14	Expected Renewals	6%
2	10,441	940	1,645	194	53	171	0.8190	140.34	158.82	LICAT on business	9%
3	9,740	877	1,534	181	49	160	0.7412	118.47	134.07	Lapses	12%
4	9,085	818	1,431	169	46	149	0.6707	100.01	113.18	Capital Target	175%
5	8,475	763	1,335	157	43	139	0.6070	84.42	95.54	Expected Earnings on Capital	5%
6	7,905	711	1,245	147	40	130	0.5493	71.27	80.65	Tax Rate	40%
7	7,374	664	1,161	137	37	121	0.4971	60.16	68.08	Target Post Tax Profit	14%
8	6,878	619	1,083	128	35	113	0.4499	50.79	57.47	Discount Rate	10.50%
9	6,416	577	1,011	119	33	105	0.4071	42.87	48.52		
10				111	30	1,041	0.3684	383.51	40.96		

		(G)	(H)		
J	Discounted Captial Cashflow at end of year 0	1,218	= SUM (H)		
K	Capital at end of Year 0	1,890			
L	Cost of Captial	-672	= (J) - (K)		
M	Discounted post-tax target profit at end of year 0	985	= SUM (I)		
N	Embedded Value	313.55	= (M) + (N)		

The value provided by the team ($275,000) is incorrect and should be $313,554 based on the information provided in this scenario.

5. **Continued**

(d)   List the items an actuary should disclose in an appraisal report according to ASOP 19.

Commentary on Question:
Candidate did well in this session. Candidates may earn additional credit for relevant items not identified in the list below.

- the scope of the assignment, including the insurance businesses being valued, and any limitations as to the availability of data
- the actuary's principal
- the duty, if any, that the actuary is assuming with respect to any user of the report other than the actuary's principal
- a description of the intended use of the report
- a description of the corporate organizational structure of the business, its distribution methods, lines of business, and products
- the appraisal date
- an appraisal value or range of appraisal values (if a single unique appraisal value is presented, an explanation of why this is appropriate)
- the methodology used to develop the appraisal, reasons for the choice of methodology, and whether a financial projection is part of the methodology

(e)   Propose a change in your assumptions that would take into consideration the Board of Directors' concern. Justify your answer.

Commentary on Question:
A good number of candidates developed one recommendation. Additional credit was awarded for relevant suggestions not identified in the list below.

- Increase the discount rate
- Decrease the target after tax profit
- Decrease the renewal increases
- Increase the lapse rates

6. **Learning Objectives:**
3. The candidate will understand how to describe and evaluate government programs providing health and disability benefits in the U.S.

Learning Outcomes:
(3a) Describe Medicare benefits and evaluate pricing and filing.

(3b) Describe Medicaid program structure and benefits and evaluate pricing and filing.

Sources:
GHFV-824-19: Chapter 20, Essentials of Managed Care

Commentary on Question:
Most candidates attempted this question and were able to achieve partial credit across all three sections; however, there were varying levels of detail provided by candidates and a mixed understanding of the calculation component. Very few candidates described the formulas or intent of the calculation and therefore missed out on many partial credit points when they had incorrect calculations as they didn't demonstrate understanding of the intent even if there was an error in the formula.

Solution:
(a) Describe the financial aspects of the plan bid amount.

The bid represents the projected monthly cost for the plan to deliver traditional Part A/B benefits for the population. It is based on the following:
- Average per capita projected allowed cost for services
- Net projected CMS cost sharing
- Plan administrative costs and profit to provide benefits

(b) Describe how the amount of the CMS benchmark impacts what a health plan can offer to a Medicare beneficiary, in comparison to the plan bid amount.

The calculated bid amount is normalized to a 1.0 risk score.

If the normalized bid amount exceeds the benchmark then the plan must charge beneficiaries the difference as a monthly premium.

If the normalized bid amount is less than the benchmark then the difference is referred to as "savings" and is shared between CMS and the plan. The rebate percentage determines the amount of savings that is available to the plan to provide additional MA benefits.

6. **Continued**

(c)   Calculate the PMPM amount available to the health plan to provide additional benefits to the beneficiary. Show your work.

Normalized bid = (Sum of net cost + administration cost + profit) / risk score
Net cost = $1,050 - $140 = $910
Normalized bid = ($910 + $50 + $30) / 1.1 = $900

Savings = Benchmark – Normalized bid = $1,000 - $900 = $100

Additional benefits = Savings x CMS rebate percentage = $100 x 65% = $65

The PMPM available for additional benefits is $65

7. **Learning Objectives:**
5. The candidate will understand how to evaluate the impact of regulation and taxation on companies and plan sponsors in the US.

Learning Outcomes:
(5b) Describe the major applicable laws and regulations and evaluate their impact.

(5c) Apply applicable standards of practice.

Sources:
GHFV-821-18: Employer Guide for Compliance with the Mental Health Parity and Addiction Equity Act

ASOP 50: Determining Minimum Value and Actuarial Value Under the Affordable Care Act

Commentary on Question:
Most candidates did well on part a and poorly on part b. As reflected in the weighting of exam points, the communication in part (b)(ii) was emphasized. Few candidates wrote enough to reflect the heavy weight on this part. Those who wrote more thorough Actuarial Communications benefited from their time investment.

Solution:
(a)
(i) Identify the features of the proposed plan that are not in compliance with the MHPAEA.

(ii) Recommend changes to the proposed plan to bring the design into compliance with the MHPAEA. Justify your recommendation.

Commentary on Question:
The candidate needed to identify and recommend solutions for four issues to receive full credit. Most candidates were able to pick out at least four of the MHSA related issues with the plan design. If the candidates' phrasing was so vague or general that it was unclear what the issue was, then no credit was given. Additionally, if the candidate made a general statement as a solution to fixing all the issues rather than suggesting individual solutions for each issue, then partial credit was given.

(i)

- Inpatient In-Network Benefit
  - In compliance (Assuming that pregnancy claims account for less than one-half of claims in this category)

7.   Continued

- Inpatient OON Benefit
  - Limit to 10 days per visit is not in compliance
- Outpatient In-Network Benefit
  - Office Visit Benefit
    - MHSA Office Visit copay may not differ for Specialist vs. Generalist. Furthermore, the MHSA Office Visit copay must pass the predominance test.
    - MHSA Specialist copay in Utah is definitely not in compliance since it's higher than all other Office Visit copays in Utah.
  - Surgery Benefit
    - In compliance
- Outpatient OON Benefit
  - Office Visit Benefit
    - The leaner coinsurance for MHSA benefits is not in compliance
  - Surgery Benefit
    - In compliance
- Emergency Care
  - In compliance if Accident Related visits account for less than one-half of claims in this category; otherwise not in compliance.
- Prescription Drugs
  - The requirement to purchase MHSA drugs through the Company mail order pharmacy or pay a surcharge is not in compliance.
  - The separate tier for MHSA drugs is not in compliance.
- Note: As displayed in the product grid, it was not clear whether or not the Inpatient INN and Inpatient OON deductibles applied to MHSA claims separately. If the candidate interpreted the deductibles as applying separately to MHSA, then credit was given for identifying the separate deductibles as not compliant.

(ii)

- Inpatient In-Network Benefit
  - No change needed (Assuming that pregnancy claims account for less than one-half of claims in this category)
- Inpatient OON Benefit
  - Limit to 10 days per visit should be removed since it only applies to MHSA claims. Alternatively, 10 day per visit limit could be applied to all claims in this category.

7. **Continued**

- Outpatient In-Network Benefit
    - Office Visit Benefit
        - Set all MHSA Office Visit copays outside of Utah equal to $30 since this guarantees that this benefit will pass the predominance test.
        - Set all MHSA Office Visit copays for Utah to be less than or equal to $25 since this guarantees that this benefit will pass the predominance test.
    - Surgery Benefit
        - No change needed
- Outpatient OON Benefit
    - Office Visit Benefit
        - Set the MHSA coinsurance equal to 60% or the non-MHSA coinsurance equal to 50% so they are equal.
    - Surgery Benefit
        - In compliance
- Emergency Care
    - Test if Accident Related visits account for less than one-half of claims in this category. If this is true, the no change is needed. If this is false, then set copay for MHSA Related visits to $100.
- Prescription Drugs
    - Remove the requirement to purchase MHSA drugs through the Company mail order pharmacy or pay a surcharge.
    - Do not separate MHSA drugs into their own tier.
- Note: As displayed in the product grid, it was not clear whether or not the Inpatient INN and Inpatient OON deductibles applied to MHSA claims separately. If the candidate interpreted the deductibles as applying separately to MHSA, then credit was given for recommending that the deductibles not be separate.

(b)
(i) Calculate a more reasonable result for the change in Actuarial Value. Show your work.

Your boss, who is a member of the American Academy of Actuaries, wants to utilize your AV change, not the AV change from the AVC.

(ii) Draft an actuarial communication documenting the difference between the AVs calculated by the AVC and using your actuarial judgement.

7. Continued

Commentary on Question:
Many candidates included the impact of induced demand in their calculation, however the AV Calculator does not adjust for induced demand within a metal tier. The correct approach would be to value only the copay change for mental health office visits from $40 to $60. Candidates received at least partial credit for correctly calculating components of the Actuarial Value (i.e. Paid and Allowed amounts).

Most candidates received only partial credit for the Actuarial Communication. In order to receive full credit, all the relevant points outlined in ASOP 50 needed to be addressed. Although most candidates addressed the unreasonableness of the AVC-AV and described the adjusted AV, few covered all of the necessary components of an Actuarial Statement of Opinion for an Actuarial Value Certification. Some candidates missed the point of this Actuarial Communication altogether.

(i)

Mental Health Office Visit Data

Copay	Util/1,000 Members	Allowed Cost per Visit	Allowed PMPM	Members
$30	400.5	$703.47	$23.48	21,750
$35	365.2	$739.84	$22.52	10,880
$40	310.6	$770.22	$19.94	16,310
$45	320.0	$672.09	$17.92	10,880
$50	266.9	$729.21	$16.22	14,140
$55	224.0	$764.76	$14.28	3,810
$60	193.2	$786.50	$12.66	26,100
$65	136.5	$594.78	$6.77	3,260
$70	71.0	$719.95	$4.26	1,630

	Util / 1,000 Mbrs	Unit Cost	Allowed PMPM	Mbrs
Overall MH Costs:	289.3	$731.92	$17.64	108,760

	Copay	Paid PMPM for MH Cost
Original	$40.00	$16.68
Proposed	$60.00	$16.20

Paid Change due to increasing Copay:	($0.48)

Estimated Grand Total Allowed: ($17.64 / 0.06)	$294.07

Impact on Total: ($0.48 / 294.07)	-0.16%

7. **Continued**

ACA Plan	Actuarial Value (Original)	Actuarial Value (Proposed)
Bronze 1	62.0%	61.8%
Bronze 2	61.5%	61.3%

(ii)

Date: 5/4/22
To: Boss, FSA, MAAA
Re: Actuarial Value Certification for Bronze level ACA Plans

Hi Boss,

Here is my draft of the actuarial communication you asked me to write for you. It documents the difference between the AV calculated by the AVC and the AV determined using actuarial judgment. Please let me know what changes you'd like me to make.

Thank you,
Candidate, ASA

Actuarial Communication:

I, Boss' Name, am a member of the American Academy of Actuaries and meet the Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States. I have the education and experience necessary to issue this Actuarial Value Certification for Bronze level ACA Plans on behalf of my employer, Insurance Company. This certification applies for the 2023 plan year.

The AVC-AV for our Bronze level ACA plans was determined in accordance with ASOP 50 and all applicable laws and regulations. However, the AVC produced unreasonable results when the Mental Health Office Visit copay increased from $40 to $60. The AVC calculated that this copay increase is worth 5%, which is unreasonably high considering that Mental health Office Visit claims account for only 6% of our plans' allowed costs. Instead, I am recommending an adjusted AV using the approach for a non-standard plan design, deviating from the guidance of ASOP 50. This adjusted AV is 0.16% lower as a result of the $20 copay increase, which is much more reasonable given the relatively small copay change and the proportion of Mental Health claims.

7. **Continued**

To determine this adjusted AV, I relied on data provided by our Analytics department. Although I checked the data for reasonableness, I did not perform an audit of the data. The data included all lines of business, including group, in order to ensure enough volume for full credibility. No adjustments were made to the data. As such, I am assuming that group data and individual ACA market data are not materially different for our purposes.

The 0.16% decrease in AV was calculated by computing the change in plan paid amount as a result of increasing the Mental Health Office Visit copay from $40 to $60. The change in paid amount reflected only the change in copay value. The utilization change was not reflected in order to be consistent with the principles of the AVC. The AVC does not take into account differences in induced demand within a metal level.

Under the standard AVC-AV approach, our Bronze level ACA plans with the $60 MHSA Office Visit copay fall outside of the *de minimus* range for bronze plans. Under the non-standard adjusted AV approach, which reflects more reasonable assumptions for our plan designs, our Bronze level ACA plans with the $60 copay fall within the *de minimus* range for bronze plans. Thus, the metal levels are assigned appropriately based on applicable law. These results are summarized in the table below.

ACA Plan	Actuarial Value (AV)	Actuarial Value (AV) with AVC change	Actuarial Value (AV) with non-standard
Bronze 1	62.0%	57.0%	61.8%
Bronze 2	61.5%	56.5%	61.3%

Signed,

Boss, FSA, MAAA

8.

Learning Objectives:
4.   The candidate will understand how to prepare and be able to interpret insurance company financial statements in accordance with U.S. statutory principles and GAAP.

Learning Outcomes:
(4a)   Prepare financial statement entries in accordance with generally accepted accounting principles.

Sources:
GHFV-109-19: Health Insurance Accounting Basics for Actuaries

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a)   Compare and contrast the benefits for AIC of a provider incentive program versus a fee-for-service model.

Commentary on Question:
*Many candidates simply listed the key characteristics of Provider Incentive Program and Fee for Services Model. However, the question is asking candidates to compare and contrast the **benefits** of a Provider Incentive Program and Fee for Services Model from the **AIC's perspective**.*

Candidates need at least 5 of the following to obtain full mark. Other reasonable responses that are not on list may also be accepted.

The benefits of a Provider Incentive Program for AIC:
- AIC can reward providers for specified outcomes based on their objectives.
- Lowers quantity of excess / unnecessary services, thus lowering overall cost / utilization.
- Aligns incentives for provider to partner with AIC in helping lower overall managed care costs.
- Creates incentive for efficient / proactive management of claims costs for individuals with chronic conditions.
- Not as drastically different from FFS model as, say, a capitation-based model; so is seen as a generally more acceptable form of reimbursement model by the provider community than global cap.

The benefits of a Fee for Services Model for AIC:
- Simple to administer.
- Easy contracting and attractive to providers.
- Accounting and actuarial support is easier.

8. Continued

(b)   Explain how two types of provider incentive programs are structured.

Commentary on Question:
In order to obtain full marks, candidates should explain how the program works (instead listing only highlights or comparing the two programs).

Quality bonus programs are oriented around incenting providers to achieve measurable healthcare outcomes. As such, a quality bonus program involves non-financial metrics, such as the HEDIS measures promulgated by the NCQA. The program may define additional payments that the provider can receive on an annual basis, over and above its normal FFS reimbursements, if the provider's performance on specified quality measures for the program year has exceeded defined benchmarks. Alternatively, the program can be structured as a so-called "withhold" instead of a bonus, meaning that a fraction of the normal fee-for-service reimbursements owed to the provider is initially retained (or withheld) by the insurer and is only remitted to the provider on an annual basis to the extent that quality benchmarks have been met.

Gain-sharing programs are oriented around sharing unexpectedly good financial results with providers, under the theory that those results are attributable in part to the provider's efforts to efficiently manage the care of their patients. As such, a gain-sharing program involves the financial performance of some relevant subset of the insurer's business, e.g., the subset of individuals who selected a primary care physician belonging to a particular provider group. The potential additional payment to the provider is often defined by reference to the loss ratio (i.e., incurred claims divided by earned premium) of the measured business for the program year, before incentives. For example, the insurer and provider may agree that if the loss ratio for the measured business is above 80% then the provider gets no additional payment, but if the loss ratio is below 80% then the provider gets 50% of the excess margin, e.g., if the loss ratio is 78% then the provider gets a bonus payment equal to 50% * (80% - 78%) = 1% of premium for the measured business.

(c)   You are given the following information:

- On 1/1/2021, AIC signs a provider incentive program with Diaby Ankle Rehabilitation Center (DARC) for the calendar year 2021.
- On 5/31/2021, AIC forecasts the full year payout of the program to DARC to be $2.4M. AIC continues to accrue for this program at the same rate throughout the program year.
- On 12/31/2021, AIC and DARC determine the annual settlement is worth $2.0M.

8. **Continued**

      (i)   Create the accounting entry for this program on May 31, 2021.

      (ii)   Create the accounting entry for this program on December 31, 2021.

Commentary on Question:
For part (i), candidates should recognize the entries are as at May 31, 2021 which means the annual figures should be prorated. For part (ii), candidates should recognize the true-up of $0.4 million. Lastly, and most importantly, candidate must accurately represent credits/debits, as well as expense vs liabilities.

Part (i)

Since reporting entries are as at May 31, 2021, $2.4 million should be prorated by 5/12 to $1.0 million. Therefore:
- Debit provider incentive expense $1.0 million
- Credit provider incentive liability $1.0 million

Part (ii)

Although the actual settlement is $2.0 million, since the year has ended, AIC should debit provider incentive liability $2.4 million. At the same time, since the final settlement is $2.0 million, AIC should credit cash $2.0 million. Lastly, the true-up of $0.4 million should be a credit to provider incentive expense.

Alternatively, if the candidate recognize the provider incentive liability is accrued at the end of the month, so before the December entry is booked, AIC already knows the full amount is $2.0 million, the true-up is only $0.2 million. As such, AIC should debit provider incentive liability of $2.2 million, credit cash $2.0 million, and credit provider incentive expense $0.2 million.

(d)   Describe challenges associated with provider incentive programs for insurers.

Commentary on Question:
Candidates need at least 5 of the following to obtain full mark. Other reasonable responses that are not on list may also be accepted.

- Difficult to set quality measure and/or define healthcare outcomes
- Hard to track which program negotiated with each provider
- Difficult to keep communication channels open at all times both within internal depts. of company as well as externally with providers.
- Data accuracy – reporting issues are common
- Data timeliness – often data not received in time for setting up an exposure liability

8. **Continued**

- Data granularity - often not available at required level of detail
- Timing issues – often the annual provider incentive metrics are hard to estimate at mid-year to forecast the FY amount.

(e)   Describe potential steps to address the challenges from part (d).

Commentary on Question:
Other reasonable responses that are not on list may also be accepted.

- Increase actuarial / finance workforce dedicated to provider incentive program forecasting & reporting.
- Identify databases and appropriate data channels that can carve out claims at a more granular level.
- Proactively identify rules-of-thumb to be used where accuracy is a concern (e.g. if the nature of the provider metric is such that it is difficult to estimate the FY amount in the middle of the year, then either use last year's results as a proxy; or assume that the max possible payout will be incurred just to be on the safe side) – either way, it is important to clearly communicate which assumptions are being used in this environment of uncertainty.
- Establish open communication channels with providers, while setting clear expectations on which data elements are needed and at what frequency.
- Establish open communication channels between internal departments (provider contracting vs finance) to ensure that latest information is making its way to the appropriate teams that can accrue payables / receivables ahead of time.

9. **Learning Objectives:**
6. The candidate will understand how to evaluate retiree group and life benefits in the United States.

Learning Outcomes:
(6b) Determine appropriate baseline assumptions for benefits and population.

(6c) Determine employer liabilities for retiree benefits under US GAAP.

Sources:
GHC-816-16 US Employers Accounting of Postretirement Benefits other than Pensions

Commentary on Question:
This question tested both the simplified and detailed approaches to calculation APBO, EPBO, and NPPBC for post-retirement benefits using a provided data table. Candidate performance on the question was mixed. In general, candidates had more familiarity with the detailed calculations for EPBO and APBO. Candidates were less successful calculating NPPBC and the simplified, "supervisor" approach.

Solution:
(a) Calculate the total aggregate APBO. Show your work.

Commentary on Question:
This question tested ability to calculate active and retiree APBO using provided assumptions. Most candidates were able to get partial credit for properly interpreting the survival, trend, discount, and attribution factors necessary for the APBO calculation. A few candidates properly calculated the active population APBO with the retiree APBO to get the aggregate APBO

Assumptions Given:	
term rate	3.00%
disc rate	5%
ret age	65
annuity	13

	Trend	Factor
Year 1	6.00%	1.06
Year 2	5.75%	1.06
Year 4	5.25%	1.05
Year 5	5.00%	1.05
Year 6	4.75%	1.05
Year 7	4.50%	1.05
Year 8	4.25%	1.04
Year 9	4.00%	1.04
Year 10+	4.00%	1.04

9. Continued

Candidate is given the table below:

ID number	Status	Claims	Age	Years of Service	survival	trend	discount	attribution	annuity	EPBO	APBO
1341209	Active	$3,055	40	5	0.4670	2.9051	0.2953	0.1667	13	$15,910	$2,652
1358335	Active	$5,385	35	5	0.4010	3.5345	0.2314	0.1429	13	$22,958	$3,280
1358385	Active	$3,076	50	20	0.6333	1.9626	0.4810	0.5714	13	$23,905	$13,660
1358468	Active	$2,793	38	18	0.4394	3.1422	0.2678	0.4000	13	$13,427	$5,371
1358474	Active	$3,673	42	12	0.4963	2.6859	0.3256	0.3429	13	$20,723	$7,105
1358535	Active	$3,291	45	8	0.5438	2.3878	0.3769	0.2857	13	$20,937	$5,982
1358622	Active	$1,074	55	25	0.7374	1.6131	0.6139	0.7143	13	$10,196	$7,283
1358650	Retiree	$3,364	65	30					13	$43,732	$43,732
1358687	Retiree	$2,666	66	40					13	$34,658	$34,658
1358754	Retiree	$2,796	69	35					13	$36,348	$36,348
1358812	Retiree	$4,132	72	25					13	$53,716	$53,716
1358842	Retiree	$2,130	68	20					13	$27,690	$27,690
											$241,476

Survival factor = (1 - term rate)^(retirement age - current age); Term Rate = 3%, Retirement Age = 65; Age (See Table)
Trend = Product (1 + Yr 1 thru 10 Trend Factor) x (1+4%)^(65 -10 - Age), e.g. Age 40 Trend Factor = Product (Year 1 thru 10 Factors) x (1.04)^(65-10-40)
Discount = (1 + discount rate)^(current age - retirement age); Discount Rate = 5%, Age (See Table), Retirement Age = 65
Attribution factor = Years of Service/(Retirement Age - (Age - Years of Service))
Active EPBO = claims x annuity x survival x trend x discount; annuity =13
Retiree EPBO = Active EPBO = Claims (a) x Annuity (13)

Survival factor = (1 - term rate)^(retirement age - current age)

Trend = Product (1 + Yr 1 thru 10 Trend Factor) x (1+4%)^(65 -10 - Age),
e.g. Age 40 Trend Factor = Product (Year 1 thru 10 Factors) x (1.04)^(65-10-40)

Discount = (1 + discount rate)^(current age - retirement age)

Attribution factor = Years of Service/(Retirement Age - (Age - Years of Service))

Active EPBO = claims x annuity x survival x trend x discount; annuity =13

Retiree EPBO = Retiree EPBO = Claims (a) x Annuity (13)

Aggregate APBO = Active APBO + Retiree APBO = **$241,476**

(b)
   (i)   Calculate the difference between your detailed approach in part (a) and your supervisor's approach. Show your work.

   (ii)   Explain the main drivers of the difference between your supervisor's approximation and your calculation.

   (iii)   Describe factors unaccounted for in your valuation that may still lead to your APBO calculation being overly simplistic.

9. Continued

Commentary on Question:
This question tested a candidates knowledge of calculating APBO using a simplified, averaging approach in a situation where a detailed approach is not possible. Many candidates neglected to calculate the average for the active population separately before combining with the retiree. Candidates also struggled with explaining drivers of the differences in calculations particularly the skewing of claims and attribution factors as a result of averaging. Most candidates were able to identify some factors unaccounted for in the valuation

(i)

	Count	Avg Claim	Avg Age	Avg YoS	Survival	Trend	Discount	Attribution	Annuity	APBO
Active	7	$3,192	44	13	0.5206	2.5254	0.3515	0.3827	13	$51,387
Retiree	5	$3,018	68						13	$196,144
			Detailed averages		0.5312	2.6045	0.3703	0.3748		$247,531
										$6,054
										2.5%

Claims, Age, YoS = Average of Actives (From Table)
Survival Factor = (1 - term rate)^(retirement age – Avg. Age)
Trend = Product (1 + Yr 1 thru 10 Trend Factor) x (1+4%)^(65 -10 - Avg. Age)
Discount = (1 + discount rate)^(Avg. Age - retirement age)
Attribution factor = Years of Service/(Retirement Age - (Avg. Age – Avg. YoS)

Retiree APBO = $196,144 (Calc. in Part a)
Simplified APBO = Simplified Active APBO + Retiree APBO = $247,531
Difference = Simplified APBO – Detailed APBO (Part A)
Difference = $247,531 – $241,476 = $6,054 (2.5% Difference)

(ii)
- The difference is due to the active APBO only (Retiree APBO is the same using either approach)
- The simplified approach results in a higher average attribution factor than the detailed approach
- The 35 year old high cost claimant skews the average claims resulting in a higher APBO under the simplified approach

(iii)
- Averages will skew differently than applying decrements to individuals
- Mortality will vary by age and gender
- Assumptions may vary for different retiree groups (Medicare vs. Non)
- Retirement rates may vary by age and service, depending on eligibility
- Retiree benefit levels may vary (e.g. grandfathered plans, pre-1990 plans, and closed groups)

9. Continued

(c)
    (i)   Explain the difference between the service cost and interest cost components of the NPPBC.

    (ii)   Calculate the total aggregate NPPBC and the difference from your supervisor's estimate. Show your work.

Commentary on Question:
Performance was mixed on this part of the question. Most candidates were able to recall formulas for NPPBC, service cost, and interest cost. Candidates were more successful calculate NPPBC under the detailed approach. Very few candidates got full credit by properly calculating the supervisor NPPBC and difference.

(i)
- Service cost is the increase in APBO due to service in the current year
    - Service cost = active EPBO/ (total active service to retirement age)
    - Service cost is zero for retired employees
- Interest cost is the increase in APBO due to the effect of interest over time
    - Interest cost = discount x (APBO + Service Cost - Expected Benefits/2)
    - Interest cost includes the impact of service cost

(ii)

NPPBC = Service Cost + Interest Cost + Amortization of Loss

Detailed:

ID number	Status	Claims	Age	Years of Service	EPBO	SC	IC
1341209	Active	$3,055.00	40	5	$15,910	$530	$83
1358335	Active	$5,385.00	35	5	$22,958	$656	$62
1358385	Active	$3,076.00	50	20	$23,905	$683	$640
1358468	Active	$2,793.00	38	18	$13,427	$298	$214
1358474	Active	$3,673.00	42	12	$20,723	$592	$293
1358535	Active	$3,291.00	45	8	$20,937	$748	$254
1358622	Active	$1,074.00	55	25	$10,196	$291	$352
						$3,799	$1,898

Service cost = Active EPBO/ (Ret. Age – (Age – YoS)) *(See Part A)*
Interest Cost = Disc. Rate*(APBO + Service Cost – Claims/2)

9. **Continued**

Detailed NPPBC

Service cost	$3,799
Interest cost	$1,898
AoL = 0	$0
NPPBC =	$5,697

Simplified:

	Claims	Avg Age	Avg YoS	APBO	EPBO	SC	IC
Active	$3,192	44	13	$51,387	$134,268	$3,868	$2,683

Service cost = Avg. Active EPBO/ (65 – (Avg. Age – Avg. YoS)) *(See Part B)*
Interest Cost = Disc. Rate*(Avg. APBO + Service Cost – Avg. Claims/2)

Simple

Service cost	$3,868
Interest cost	$2,683
AoL = 0	$0
NPPBC =	$6,551

Difference = Simplified NPPBC - Detailed NPPBC
Difference = $6,551 - $5,697 = $854 (15% Difference)

10.

Learning Objectives:

5. The candidate will understand how to evaluate the impact of regulation and taxation on companies and plan sponsors in the US.

Learning Outcomes:

(5b) Describe the major applicable laws and regulations and evaluate their impact.

Sources:

GHFV-823-20-Recent Policy Changes Under The ACA

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a)

(i) Calculate the Advance Premium Tax Credit (APTC) for each of Joe and Carole. Show your work.

(ii) Calculate the net monthly premiums for Joe and for Carole under each plan offered on the exchange. Show your work.

Commentary on Question:

Candidates did not answer this part well. The calculation includes trending experience data, normalizing rates, adjusting for actuarial values and ages. No candidate was able to do all steps correctly. Also, most candidates applied the 80% minimum loss ratio to get gross premium, while the question asked to calculate net monthly premiums only. To calculate APTC, candidates need to identify the benchmark plan, the second-lowest-cost silver tier plan. Some used the second highest. Some knew to use the second-lowest but pointed to the wrong plan. No credit was given for just writing "second-lowest-cost silver tier plan".

10. Continued

First - determine what the gross monthly premiums would be									
	Lion	Med	Rx	MMs		**Tiger**	Med	Rx	MMs
	2019 Experience (Allowed)	$162,415,286	$56,505,411	553,656		2019 Experience (Allowed)	$151,363,169	$37,057,250	451,344
	2019 PMPMs	$293.35	$102.06			2019 PMPMs	$335.36	$82.10	
	Annual Trend	7%	13%			Annual Trend	7%	13%	
1pt	2022 PMPMs (2019 PMPM * (1+trend)^3)	$359.37	$147.26		1 pt	2022 PMPMs (2019 PMPM * (1+trend)^3)	$410.83	$118.47	
1 pt	Total 2022 Allowed PMPM, Age 40	$506.63				Total 2022 Allowed PMPM, Age 35	$529.30		
					1 pt	Total 2022 Allowed PMPM, Age 40 (divide by 0.83)	$634.14		
	Multiply $506.63 by age factor and actuarial values					Multiply $634.14 by age factor and actuarial values			
2pts	Age Factor:	1	0.73333	1.33333	2pts	Age Factor:	1	0.73333	1.33333
AV		Age 40	Age 30	Age 50	AV		Age 40	Age 30	Age 50
0.79	Gold	$400.24	$293.51	$533.65	0.82	Gold	$520.00	$381.33	$693.33
0.72	Silver	$364.77	$267.50	$486.36	0.7	Silver	$443.90	$325.53	$591.87
0.62	Bronze	$314.11	$230.35	$418.81	0.59	Bronze	$374.15	$274.37	$498.86

APTC Calculation									
	Joe (Single, Age 50)					**Carole (3 people in household, Age 30)**			
	FPL	12760				FPL	$21,720		
	Income	35000				Income	35000		
	Income as % of FPL	274%				Income as % of FPL	161%		
	Max Premium %	8.33%				Max Premium %	4.14%		
Joe	Max Premium $ (income * % / 12)	$242.96	1pt		Carole	Max Premium $ (income * % / 12)	$120.75	1pt	
Joe	Benchmark = second lowest silver	$591.87	1pt		Carole	Benchmark = second lowest silver	$325.53	1pt	
Joe	APTC (Benchmark - Max Premium)	$348.91	1pt		Carole	APTC (Benchmark - Max Premium)	$204.78	1pt	

Final Net Premiums				
	=MAX(Premium for Age and AV - APTC,0)			
	Joe:	Lion	Tiger	
	Gold	$184.74	$344.42	3pts
	Silver	$137.45	$242.96	
	Bronze	$69.90	$149.95	
	Carole:	Lion	Tiger	
	Gold	$88.73	$176.55	3pts
	Silver	$62.72	$120.75	
	Bronze	$25.57	$69.60	

(b) Assess the directional impact of the silver loading on net monthly premium for each plan by filling out the chart below with "increase", "decrease", or "unchanged".

Commentary on Question:
This part was answered very well by candidates. Candidates could receive high to full score regardless of the work in part 1.

Directional Change in Net Monthly Premium						
	Lion Bronze	Lion Silver	Lion Gold	Tiger Bronze	Tiger Silver	Tiger Gold
Carole	↓	⊢	↓	↓	⊢	↓
Joe	↓	⊢	↓	↓	⊢	↓
OR						
Carole	Decrease	Unchanged	Decrease	Decrease	Unchanged	Decrease
Joe	Decrease	Unchanged	Decrease	Decrease	Unchanged	Decrease

11.

Learning Objectives:

4. The candidate will understand how to prepare and be able to interpret insurance company financial statements in accordance with U.S. statutory principles and GAAP.

Learning Outcomes:

(4b) Interpret the results of both statutory and GAAP statements from the viewpoint of various stakeholders, including regulators, senior management, investors.

(4c) Project financial outcomes and recommend a strategy.

(4d) Apply applicable standards of practice.

Sources:

GHC-819-18 Practices for Preparing Health Contract Reserves

ASOP 21 Responding to Auditors for Financial Reviews

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Describe the ultimate test of reserve adequacy according to Statutory Accounting Principles (SAP).

> **Commentary on Question**: *Candidates were very successful with this part of the question and were able to describe in appropriate detail the Goss Premium Valuation. A common mistake was to exclude the present value of the reserve as part of their response.*

> For SAP, a prospective Gross Premium Valuation (GPV) is the ultimate test of reserve adequacy. A GPV compares the present value of future claims, expenses, and ending reserves (unearned premium, claim, and contract) with the present value of future gross premiums and current reserves (unearned premium, premium deficiency, claim, and contract). Extra reserves need to be recorded if the gross premium valuation determines any reserve inadequacy.

(b) Describe the purpose and implications of the test in part (a).

> **Commentary on Question**:
> *Again, candidates were successful in describing the purpose and implications for the Gross Premium Valuation.*

11. Continued

- NAIC Guidance states that inflation of future benefit costs should be recognized in reserve factors so that actual costs do not diverge significantly from future projected cost levels.
- This analysis/test must be performed whenever a significant doubt exists as to reserve adequacy with respect to a major block of contracts or with respect to the insurer's health business as a whole.
- If a deficiency is found through the gross premium analysis, immediate loss recognition must be made and the reserves are to be restored to an adequate level.

(c) Calculate whether extra reserves, as of 1/1/2021, need to be recorded based on SAP. Show your work. Justify your answer.

Commentary on Question:
Most candidates were able to calculate the additional reserve needed based on the numbers provided. Common mistakes were miscalculating the monthly interest rate, not recognizing all payments as being made at the end of the month, even though this was stated in the question and not fully justifying their response or making a recommendation.

PV Factor	PV (Claims)	PV (Expenses)	PV (Premium)
0.996	$13.9	$2.0	$19.9
0.992	$18.8	$2.0	$19.8
0.988	$16.8	$2.0	$19.8
0.984	$19.7	$2.0	$19.7
0.980	$17.6	$2.0	$19.6
0.976	$21.5	$2.0	$19.5
0.972	$14.6	$1.9	$19.4
0.968	$15.5	$1.9	$19.4
0.964	$11.6	$1.9	$19.3
0.960	$20.2	$1.9	$19.2
0.956	$25.8	$1.9	$19.1
0.952	$26.7	$1.9	$19.0
PV =	$222.7	$23.4	$233.8
GPV =		($7.3)	

An additional reserve of $7.3million needs to be recorded.

(d) Compare and contrast the test in part (a) with Generally Accepted Accounting Principles (GAAP) loss recognition testing.

11. Continued

Commentary on Question:
Most candidates were able to pick up partial credit on this question successfully noting both similarities and differences in the SAP and GAAP. Candidates lost credit if they just listed features of the test but did not compare and contrast the two approaches. Additionally, some candidates did not provide enough similarities/differences for full credit.

- Similarities:
  - Both are tests of reverse adequacy utilizing current best estimate assumptions.
  - In case of a deficiency, both tests require a charge to earnings (either by increasing reserves or by writing off the DAC).

- Differences:
  - Timing: Gross premium valuation is only required to be performed when the company has a concern about reserve adequacy. Due to the complicated relationship with deferred acquisition costs, GAAP loss recognition testing should be performed as a regular course of business. Similarly, a company may have situations in which, Due to conservative SAP reserve assumptions, it has no concern about SAP reserve adequacy but finds GAAP reserves to be deficient.
  - Grouping: SAP gross premium valuation tests often are performed at a relatively aggregated level, which could be as high as the company level. For GAAP, FAS 60 requires the testing to be performed using groupings consistent with how products are acquired, serviced, and measured. The minor wording differences between the SAP and GAAP guidance are not intended to signify a major difference in groupings. But differences in granularity of testing may arise from the fact that SAP reporting is performed at the legal entity level, whereas GAAP reporting is performed at the consolidated enterprise level. There appears to be a wide variety of practice and interpretation in this area.
  - Treatment of expenses: A SAP gross premium test is to include all expenses, whereas the GAAP gross premium recoverability testing is required to include only settlement and maintenance costs.
  - Conservatism: Many actuaries believe the SAP gross premium test should be based on assumptions that would produce an adequate reserve under moderately adverse development. GAAP gross premium tests generally are believed to be performed based on assumptions that represent the expectation of ultimate outcomes. Assumptions involving future morbidity improvement and future rate increases may be appropriate for GAAP purposes but inappropriate for most SAP purposes.

11. Continued

(e)   Recommend three methods of modifying the reserve factors that would be appropriate for GAAP reporting. Justify your recommendations.

Commentary on Question:
Candidates struggled on part (e) of the question. Many were unable to recommend appropriate methods. Those who did, often didn't delineate between approaches that were appropriate for GAAP reporting and those that were not. Finally, candidates could have received more credit if they justified their recommendations rather than just listing and describing the approaches.

- There are a number of approaches to recognizing inflation of future benefit costs. Reserve factors should always be developed recognizing any anticipated increase in benefit costs that results from the aging of the insured individuals. Additional cost increases that are projected to arise from inflation, general changes in utilization, etc., may also be incorporated in the initial development of reserve factors. If that is not done, or if the actual cost increases diverge significantly from the projected levels, it will be necessary to modify the reserve factors
  - **Do nothing approach**: Reserves are based on initial level of benefits with no adjustments made for future actual increases in benefits after issue. Future increases in benefits are funded by the potential for future increases in premiums. This method should be used only when consistent with the policy rating structure and the company has demonstrated a proven ability of increasing rates in future years commensurate with the significant cost increase.
  - **Proportional approach**: Multiply the contract reserve by a factor that reflects the cumulative inflationary cost increases since contract reserve factors were developed. This method hinges on consistent historical and expected future increases in the net premiums and incurred claims for the coverage.
  - **Benefit rider approach**: Calculate a new set of contract reserve factors that reflect the new cost increase and add this to the prior contract reserve factors. May be easy to quantify just the impact of ER OON visits and then layer on to initially developed contract factors.
  - **Loss ratio approach:** Project a target loss ratio based on pricing assumptions for a block of business. This target loss ratio will be used to develop an expected incurred claims amount. The reserve is then the retrospective difference between the expected incurred claims and the actual incurred claims to-date. This is one of the easier methods to implement and could be used as a transitory methodology until insurer has sufficient experience to develop new factors with experience data.
  - **New Factor Approach** is ruled out as it would violate GAAP's lock-in principle. Assume Benefits Increase Initially is ruled out because this benefit change was not a normal inflationary event, but an unexpected benefit change.

11. Continued

(f)   Describe what you should consider when responding to the request for information, as per ASOP 21.

Commentary on Question:
Candidates generally were successful in part (f) of this question.

In responding to requests for information, the responding actuary should consider the following:
- the extent to which the information requested is readily available;
- if the information requested is not readily available, what other information is available or reasonably can be produced that can meet the auditor's or examiner's needs; and
- whether the information requested is within the scope of the financial audit, financial review, or financial examination.
- To the extent practicable, the responding actuary should work with the auditor or examiner if there are conflicts or time frames that cannot be met.

12. **Learning Objectives:**

3. The candidate will understand how to describe and evaluate government programs providing health and disability benefits in the U.S.

Learning Outcomes:

(3a) Describe Medicare benefits and evaluate pricing and filing.

Sources:

Essentials of Managed Healthcare, Chapter 24

Medicare Part D Settlements – A Primer, Health Watch, June 2019

Commentary on Question:

This question tested knowledge of the Medicare Part D program. Most candidates did quite well on part (c), and many received most or full credit for part (a). Candidates did not generally do well on part (b). Given that this part was worth 3 points, candidates were expected to provide more information than for part (a), but many did not. We noted that there was a typo in the question that said "Medicaid Part D". This typo did not seem to affect responses.

Solution:

(a) Outline how a prescription drug plan (PDP) shares financial risk with CMS.

     Commentary on Question:

     This question tested specific risk-sharing provisions described in the assigned text. To get full credit, candidates must have listed and described the three primary risk sharing facets of Medicare Part D (risk corridors, low-income cost sharing and premium subsidies, and reinsurance). Credit was not given for other aspects which do not include risk sharing with CMS (direct subsidy and coverage gap discounts), but points were not deducted if candidates mentioned them.

     Risk Corridor Payments – If the PDP's actual adjusted costs for a given year exceed the projected cost by more than 5%, CMS will pay the plan 50% of the amount in excess of 5%. If the PDP's cost exceed 10% of the expected amount, CMS will pay 80% of the amount in excess of 10%. Conversely, the PDP must pay CMS 50% or 80% of any amount by which costs are less than 5% or 10% of the expected cost.

     Low Income Subsidies – CMS provides premium (LIPS) and cost-sharing (LICS) subsidies to PDPs for low-income beneficiaries

     Reinsurance – CMS provides reinsurance for members with high out-of-pocket costs (above a current-year threshold)

12. Continued

(b)   Explain the importance of estimating Part D settlements before the final true-up with CMS.

Commentary on Question:
For full credit, candidates must have provided general information about the timing and recognition of settlements, as well as points on timing of specific aspects of the program.

Cash flows vary throughout the year as a result of the Part D benefit design. Final settlement occurs roughly 6-9 months after the end of the contract year. Year-to-date payments from CMS may exceed actual claims payments, so plans must hold early payments received when the plan costs are low to pay for higher plan liabilities later in the year.

Coverage gap discount program (CGDP) – Pharmaceutical companies are responsible for the majority of drug costs in the gap. Plans invoice the manufacturers quarterly. This subsidy is estimated in the bid submission process. Amounts are reconciled after the end of the plan year.

Reinsurance and LICS payments are steady throughout the year based bid projections in bid submission, but the associated claims are not. Reinsurance costs are zero at the beginning of the year until members reach the catastrophic threshold. LICS costs vary over time, with high subsidies during the deductible phase, lower subsidies in the pre-ICL coverage phase where standard plan cost-sharing is lower, and higher subsidies in the coverage gap and catastrophic phases.

(c)   Calculate the monthly CMS direct subsidy payment (PMPM) to Part D plans. Show your work.

Commentary on Question:
This was a straightforward application of formulas that were covered in the text. Most candidates got full credit on this part.

Step 1: Calculate base beneficiary premium
Base beneficiary premium = National average monthly bid × [0.255 ÷ (1 – % of total paid as reinsurance]
Base beneficiary premium = $48.00 × [0.255 ÷ (1 – 60%)] = $30.60

Step 2: Calculate direct subsidy
Direct subsidy = National average monthly bid - base beneficiary premium
Direct subsidy = $48.00 - $30.60 = **$17.40**