Course Coverage

Question	Unit	Key performance outcome	Learning objective	Marks
1 a)	2, 3, 4	2.5, 3.9, 3.10, 4.14	2.5.1, 2.5.2, 3.9.2, 3.9.3, 3.10.3, 4.14.1, 4.14.2	19
1 b)	1, 2, 3, 4	1.2, 1.3, 2.4, 2.5, 3.8, 3.9, 3.10 4.12, 4.13, 4.14	1.2.6, 1.3.2, 1.3.3, 2.4.3, 2.5.2, 3.8.3, 3.9.3, 3.10.3, 4.12.3, 4.12.4, 4.13.1, 4.14.2	11
2 a)	2	2.5	2.5.6	8
2 b)	2	2.5	2.5.6	7
2 c)	2, 4	2.4, 2.5, 4.13	2.4.1, 2.4.3, 2.5.5, 2.5.6, 4.13.1	15
3 a)	2, 4	2.4, 2.5, 2.7, 4.12	2.4.1, 2.5.2, 2.5.5, 2.7.1, 2.7.3, 2.7.4, 4.12.2	16
3 b	1, 2, 4	1.1, 1.2, 1.3, 2.4, 2.5, 4.12	1.1.1, 1,1,2, 1.3.2, 1.3.3, 2.4.3, 2.5.4, 4.12.1, 4.12.2, 4.12.3	14

QUESTION 1

a) (i)

Changing medical limits is likely to have the following impact on expenses

- Medical exams and blood test will no longer be required for 35% of lives. This equates to a cost saving of $193 per completed application. This will impact $ per policy acquisition unit costs. (1 mark)
- A 20% sales uplift will mean that there will be more policies in force that can contribute to covering the cost of fixed overheads. As these expenses are independent of policy size and are incurred regardless of volume of business written, it is assumed they are allowed for in $ per policy unit costs. The estimated saving is $3 per policy. Given this adjustment is not material and the uncertainty around achieving sales volumes, this component of $ per policy unit costs has not been changed. (1 mark)
- All other expenses (% per premium) vary with business volumes so are unchanged by the increase in sales volumes. (1 mark)
- Refer tab '1a(i) Unit Costs in C2A_2016_S2_Q1a_Solutions.xlsx' for workings. (1 mark for workings)

Proposed new unit costs

Category	Current assumptions	Proposed assumptions
Acquisition $ per policy	$556	$364
Acquisition % of premium	15%	15%
Renewal $ per policy	$50	$50
Renewal % of premium	10%	10%

Total 4 marks

(ii) Without medical exams and bloods it is assumed that more lives will be accepted as standard. The likely implications of this are:

- The average health loading applied to premiums for these lives will decrease because premiums will not be loaded. (1 mark)
- It is expected this will reduce the average health loading applied to premiums from +33% to +21%. (1 mark)
- The average health loading applied to claims is likely to increase. While a life may be accepted as standard in respect of their premium loading, their likelihood of dying will remain unchanged. There is also an increased risk of anti- selection and accepting as standard lives that otherwise would have been declined. (1 mark)
- It is expected this will increase the average health loading applied to claims from +33% to +63%. (1 mark)
- Refer tab 1a(ii) Health Loading in C2A_2016_S2_Q1a_Solutions.xlsx for workings. (1 mark for workings)

Total 5 marks

(iii)

M40NS	**Premium (incl policy fee)**	**Claims**	**Acq Exp**	**Ren Exp**	**IRR**
Current	8600	3889	716	947	14%
Proposed	8020	4764	512	896	5%
Difference	-581	875	-203	-51	-8%

- 1 mark for application of premium loading to premium cashflows
- 1 mark if student discusses only loading the risk component of premiums and/or includes a loss ratio as per the solutions.
- 2 marks for application of claims loading to decrement table so it flows through to all cashflows (award 1 mark if student applies loading to claims cashflows only)
- 1 mark for calculation of PVs
- 1 mark for calculation of IRR
- 1 mark for PV Premiums that shows a reduction from current to proposed
- 1 mark for PV Claims that shows an increase from current to proposed
- 1 mark for PV Acq Exp that shows a reduction from current to proposed driven by reduction in $ acquisition unit costs.
- 1 mark for PV Ren Exp that shows a small reduction from current to proposed driven by increased decrements only (Award full mark if student adjusts $ per policy expenses for impact of sales on overheads).
- 1 mark for reduction in IRR from current to proposed.

Award marks for results that are consistent with the assumptions proposed by student in (i) and (ii). If directional change is inconsistent with expectations (ie premiums lower, expenses lower, claims higher, IRR lower) award maximum of 5 marks.

Max 10 marks
Total 19 marks (4 + 5 + 10)

b)

MEMO

To: Appointed Actuary

From: An Actuary

Date: DD/MM/YYYY

Subject: Proposal to change underwriting limits for yearly renewable term business.

The following information relates to the impact of a change to medical limits for YRT new business for 2017. It outlines our current findings in relation to the impact of the proposal on profitability and the adequacy of premium rates and uncertainty and future experience.

The findings discussed in this memo are based on preliminary analysis for a sample model point (40MNS with SI $1m). Next steps for our analysis are therefore outlined.

(i) Profitability and adequacy of premium rates

- Proposed change to underwriting limits impact an estimated 35% of applications and are likely to have the following impacts
  - Reduction in expenses (est. $208K) as a result of ordering less medical exams and blood tests. Savings should be realised in both the cost of medical tests and time spent by underwriters to review the results. Both of which will help to reduce acquisition expenses.
  - Claims cost is expected to increase due to anti-selection and risk of accepting as standard lives that would have been declined or deferred if medical exams and blood tests were ordered.
  - Premium income at a policy level is expected to reduce as a result of offering standard terms to lives who would have been loaded based on the results of medical screening, however once we allow for the uplift in sales volumes, initial analysis indicates total premium income may increase in aggregate.
  - These effects will in part be mitigated where underwriters order medical exams and blood tests on a discretionary basis.
    (2 marks)

- Preliminary modelling suggests that, as a result of these changes, the internal rate of return for a indicative sample model point will reduce from an estimated 14% to 5%. The estimated reduction in premium revenue and increased claims cost are having a greater impact than the expected saving in acquisition expenses for this model point. (1 mark)

- While premium income may increase in aggregate from the increase in sales, which is aligned with the CEO's focus on revenue generation, the business may be less profitable. A return of 5% does not meet Risky Business Life's hurdle rate of 12%. This suggests current premium rates would be insufficient to meet required returns by shareholders. (1 mark)

Total 4 marks

(ii) Uncertainty and future experience

- Key areas of uncertainty that may impact future claims costs are
    - The risk that more unhealthy lives may try to obtain cover from Risky Life Co, especially as the proposed new limits are market leading in comparison to our competitors.
    - The risk of accepting lives that would currently be declined or deferred.

  (1 mark)

- The risk of poor claims experience is not immediate and so may not be realised for several years after the change is implemented. (1 mark)

- In the event of bad experience, Risky Business will have the option of reducing medical limits and/or tightening parameters for requesting medical exams or blood tests on a discretionary basis, although this will only impact future new business. Risky Business also has the option to increase premium rates for existing and new YRT business. (1 mark)

Total 3 marks

(iii) Next steps

- Judgement has been used to set assumptions in respect of anti-selection, acceptance of lives who would otherwise have been declined or deferred, claims health loadings in the absence of medical screening and the ordering of medical tests on a discretionary basis. The next step is to use sensitivity testing and scenario analysis to attempt to understand the potential impact of this uncertainty. To develop plausible scenarios, we will consult with underwriting and claims management. (1 mark)

- Preliminary modelling has allowed for an estimated 20% increase in sales volumes in acquisition $ per policy unit costs. The current approach to modelling has focused on IRRs and so has not considered $ profit. To do so will demonstrate more clearly the impact of the sales uplift. As a next step we will research whether the Head of Sales' estimate is justified and will run sensitivities on these volumes. The final report should include both the % and $ impact on profit to assess whether it meet shareholders' expectations. (1 mark)

- Current modelling is based on one model point, MNS40 with a sum insured of $1m. The impact of this proposal should be assessed at a portfolio level, given 65% of business is unaffected by this change. (1 mark)

- We will also investigate varying medical limits by age, smoker status and sex. This could help to achieve closer alignment with competitors and improve profitability of the proposition. (1 mark)

- Additionally, we could investigate the impact of a less aggressive change to medical limits that matches our competitors, rather than attempting to be market leading. The impact on sales volumes would need to be balanced with the benefits of increasing premium income and reducing claims cost, mainly by reducing the risk of anti-selection. (1 mark)

Max 4 marks

Please don't hesitate to contact me should you require any further information.

Yours sincerely

An Actuary

1 mark for any other reasonable point

0.5 marks for memo format

Total 11 marks (4 + 3 + 4)

Total 30 marks (19 + 11)

QUESTION 2

a)

(i)

- Non-proportional reinsurance (eg stop loss or catastrophe) provides cover at a portfolio rather than individual level such that the reinsurer will pay if total claims are above a certain level. (1 mark)
- Due to the asymmetric nature of the risks, non-proportional reinsurance can be difficult to price and value in comparison to quota share and surplus. As a result, a reinsurer's capacity to support these types of contracts may be limited which means cover can be expensive or not available. (1 mark)
- Small Life Co is a small life insurer and as such it may prefer to have the reinsurer involved in individual claims so as to get access to technical expertise. (1 mark)
- Small Life Co's size and risk profile may be such that on a cost benefit basis, it can achieve its objectives with proportional cover. (1 mark)

1 mark per point, and for any other reasonable point

Total 4 marks

(ii)

- The financial impact of entering into a reinsurance arrangement can be assessed against a chosen metric (eg impact on capital) to determine whether it is advantageous to transfer the risk rather than retaining it. (1 mark)
- In addition to the financial impact, other factors may influence a decision whether to enter into a reinsurance arrangement, for example access to technical expertise to assist with underwriting, product design and claims management. For these reasons, a life insurer may engage a reinsurer, even if to do so does not result in a cost saving. (1 mark)

1 mark per point, and for any other reasonable point

Total 2 marks

(iii)

The reasons a reinsurer may be able to accept risk on terms that are favourable to a life company while still achieving its hurdle requirements include

- Reinsurers pool a large volume of risks and can diversify across products, cedants and geographies. In doing so, the impact of adverse claims or shocks to claims experience may be less than for a life company retaining the risk, meaning a reinsurer may be able to hold less capital for the business. (1 mark)

- Similarly, reinsurance can sometimes be viewed as 'regulatory arbitrage' whereby business is either written or retroceded overseas where regulatory capital requirements and taxation arrangements may differ. Lower capital or taxation can be passed on to cedants. (1 mark)

1 mark per point, and for any other reasonable point

Total 2 marks

Total 8 marks (4 + 2 + 2)

b)

1. ABC Quota share

Cession rate	70%	
Reinsurance premiums	Office	
Reinsurance commission	Y1	100%
	Y2	45%
	Y3+	25%

Year	Reinsurance premiums	Reinsurance commission	Reinsurance claims	Net cashflow
1	599,372	599,372	299,686	299,686
2	1,345,589	605,515	672,795	(67,279)
3	3,020,847	755,212	1,510,424	(755,212)
Total				**(522,805)**

2. XYZ Surplus

Cession rate	7%	
Reinsurance premiums	Risk, % office	60%
Reinsurance commission	Y1	60%
	Y2	30%
	Y3+	0%

Year	Reinsurance premiums	Selection discount	Reinsurance claims	Net cashflow
1	36,281	21,768	30,234	15,722
2	81,450	24,435	67,875	10,860
3	182,855	-	152,379	(30,476)
Total				**(3,894)**

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- 1 mark for cession rate for XYZ Surplus
- 3 marks per table (deduct 0.5 marks for each error)

Total 7 marks

c)

Profit

Maximisation

- XYZ's surplus arrangement is better from a profit maximisation perspective as the net cash outflows are lower. This is because less risk is being transferred to XYZ Re (cession rate = 7% vs 70% for ABC) so, on a best estimate basis, less profit has also been transferred to the reinsurer. (1 mark)
- ABC Re's quota share arrangement is considerably more costly than XYZ Re's after year 3 (523K vs 4K). We would expect quota share reinsurance to be more expensive than surplus, as a result of involvement of ABC Re in all claims, rather than just large claims, as is the case with surplus. (1 mark)

Volatility

- ABC Re: In the event of poor experience for either small claims or across all claim sizes, ABC Re's quota share arrangement would share in all losses, reducing profit volatility. Conversely XYZ Re's surplus arrangement would only share in losses for claims above the retention, so there is the possibility of more volatility if experience on small claims is poor. (1 mark)
- XYZ Re: In the event poor claims experience for large case sizes, Small Life Co's exposure to losses would be capped to the extent of the retention, such that a greater proportion of losses would be borne by XYZ Re. (1 mark)

(4 marks)

Risk Management

- XYZ Re's surplus quote is based on a cession rate of 7% in comparison to 70% for ABC Re's quota share quote. A lower cession rate means a greater proportion of risk is retained which is unfavourable from a risk management perspective. (1 mark)
- Given Small Life Co is a small life insurer, a large exposure to insurance risk may not be desirable. Management may prefer to a lower total risk exposure so as to manage capital and reduce volatility of underwriting profit. (1 mark)
- Quota share may reduce underwriting and/or claims handling errors due to involvement of reinsurer in all case sizes so entering into an arrangement with ABC may be helpful for managing operational risk. (1 mark)

(3 marks)

Capital Management

a. New business strain

- Year 1 reinsurance commission for ABC Re's quota share is higher than XYZ Re's year 1 selection discount (100% of office premiums vs 70% of risk premiums). As a result ABC Re's quote provides better relief against new business strain. (1 mark)

b. Risk capital

- Both quota share and surplus quotes are proportional, so the reinsurer would absorb the same proportional share of the shocked and best estimate cashflows assuming the shock is independent of sum insured. ABC Re's quote has a higher cession rate (70%) than XYZ Re's (7%). This means a higher proportion of risk would be transferred under ABC Re's quote resulting in lower capital requirements. (1 mark)
- This needs to be balanced against counterparty risk capital requirements as ABC Re has a lower (BBB) credit rating than XYZ Re (AA) and so the risk of default is perceived to be higher. (1 mark)

(3 marks)

Other factors

- As every policy, regardless of size would be reinsured by ABC Re under a quota share arrangement, then Small Life Co could expect a higher level of underwriting and claims support than from XYZ Re who would only be interested in policies above the retention. Being a smaller insurer, Small Life Co may place greater value on this additional support. (1 mark)
- In addition to having a lower credit rating than XYZ Re, ABC Re has only recently received its licence to write business in Australia. In comparison, XYZ Re has a long established reputation in the market, is larger and has experience writing both life and general business. The size of XYZ Re's book means it is more experienced and may be more effective at diversifying risks. (1 mark)
- The loss ratio implied by gross claims and premiums is 50%. The premium rates proposed by XYZ Re are 60% of office premiums. Given these are supposed to reflect risk premiums, it provides a rough indication of XYZ Re's implied loading, which appears relatively high. (1 mark)
- The ancillary benefits provided by each reinsurer, such as staff training, product development and market intelligence, should be taken into account when assessing the quotes. (1 mark)
- Each reinsurer's reputation and expertise in certain fields should also be considered. (1 mark)
- Ease to do business with and other relationship considerations should be considered. With Small Life Co being a small insurer, there is a risk that its needs could be viewed by the reinsurer as being of a lower priority than those of a larger client. It needs to ensure that its needs will be adequately met by the reinsurance partner it chooses. (1 mark)

- The reinsurer's capacity should be considered. Small Life would not want to be in a position where the reinsurer is unable to accept further business due to capacity constraints. (1 mark)

Max 5 marks

(Award 1 mark for any other reasonable point.

Where students have produced different numbers in part b) award marks for analysis that is appropriate for their results.)

Total 15 marks

Total 30 marks (8 + 7 + 15)

COURSE 2A LIFE INSURANCE SEMESTER 2 2016 MARKING GUIDE

QUESTION 3 **(30 Marks)**

a)

What	Why	How
Data	To manage and measure the performance of the business, detailed and accurate data should be collected and maintained. (1 mark)	Assess the current state of records and the ability of systems to capture all information needed, for example individual policyholder details, UW decision, reason for claim, reinsurance arrangements. (1 mark) Assess the quality of data and the controls in place to minimise errors so as to determine whether it is reliable. (1 mark)
Underwriting	Underwriting standards should be technically sound and supported by strong underwriting capabilities and compliance so as to ensure anti selection is managed at point of sale. (1 mark) The purpose of underwriting is to determine the terms (if any) on which applications are acceptable. In doing so, premiums can be loaded, conditions excluded or lives declined or deferred so as to ensure premiums paid are commensurate to the risk the life represents. (1 mark)	Engage, for example a third party reinsurer or consultant to undertake an • Independent assessment of underwriting standards • Audit compliance with underwriting standards • Independent review of underwriting skills. (1 mark)
Claims	To ensure only valid claims are paid, claims assessors should be skilled, properly trained and adequately resourced. (1 mark) Similarly, the process should treat customers fairly so as to manage risk of reputational damage. (1 mark)	Independent assessment (eg third party reinsurer or consultant) of claims management capabilities and resourcing. (1 mark) Ensure there is appropriate planning to allow for adequate claims resourcing for expected claims volumes based on growth in business volumes. (1 mark) Review outcomes from claims audits. (1 mark) Assess the appropriateness of monitoring of claims operational metrics (eg number of claims per assessor, adherence to service level standards, number

		of claims closures, claim re-open rates). (1 mark) Undertake a reconciliation of claims eg reported vs claims in the general ledger vs claims used for experience studies vs reinsurance recoveries. (1 mark)
Product Design	Product features should be driven by customer or adviser demand which should be determined when undertaking an initial screening of new ideas. (1 mark) Policy terms should be clear and transparent. Definitions should be unambiguous and be written in such a way that addresses future advances in medical treatment. (1 mark)	Undertake 'market research' with existing customers; review customer feedback and complaints; consult with distribution and/or financial advisers to • assess their ability to understand their products and terms and conditions. • Test the perceived value of different product features. (1 mark)
Risk appetite statement	A clearly articulated risk appetite statement is fundamental to a sound risk management. It is an essential part of an enterprise risk management framework as it sets the boundaries and expectations for the business. (1 mark) The risk appetite statement forms the basis for risk tolerance levels, risk targets and risk limits. These assist the business to ensure business decisions are aligned with the risk appetite. (1 mark)	Assess LTL's current risk appetite statement to determine whether it provides clear guidance as the quality of insurance risk that is acceptable. (1 mark) Assess risk tolerances, targets and limits to determine if they are clear and effective at translating the risk appetite statement into an operational framework, eg • level of uncertainty in pricing • product design frameworks • volatility of claims experience • underwriting and claims procedures (1 mark) Undertake risk monitoring, scenario analysis and stress testing to assess whether the risk appetite statement, risk tolerance, risk targets and risk limits are appropriate given changes in the business environment or LTL's strategy. (1 mark)

1 mark for any other reasonable point

- Data – max 3 marks
- Underwriting – max 3 marks
- Claims – max 4 marks
- Product design – max 3 marks
- Risk appetite statement – max 3 marks

Award 0.5 marks if student suggests external review but does not detail what it should address.

Total 16 marks

b)

(i)

- Terminal illness benefits are viewed as an accelerated pay out as the benefit would otherwise be paid once the life insured dies in 1 (or in this case 2) years.
- As a result, claims cost would not be expected to increase (apart from acceleration of the benefit) unless loosening the definition increases the risk of the life insured being incorrectly diagnosed as likely to die within two years or if a medical breakthrough means the life insured recovers.
- The only other way that claims cost might increase is if cover would have otherwise lapsed, although this is unlikely.
- An explicit cost for TI cover is not built into premium rates as it is an accelerated payment. If LTL thought the risk of misdiagnosis or medical breakthroughs increased materially as a result of the change in definition, it may choose to cost for this loosening in definition. This would mean premium rates would increase to reflect this expected cost.
- In the event the life insured had other benefits, such as a TPD or trauma rider that was in force at the time of the TI claim, the rider would be extinguished and premiums would cease for both death cover and the rider benefit. Loosening the definition from 1 to 2 years would mean foregoing a year of additional premiums under these circumstances.
- Accelerating payment of the sum insured would result in a loss of investment earnings as LTL would need to liquidate assets backing liabilities to pay claims earlier than expected.
- Due to its relatively short term nature, YRT tends to be backed by relatively risk free, liquid assets. Loss of investment earnings would be in the vicinity of the current cash rate. In a higher interest rate environment, the impact of loss of investment earnings would have greater importance.
- This change in definition would align LTL's TI cover with recent changes to SIS conditions for release for TI. While LTL is not a superannuation fund, advisers and customers may view this change positively which could have a favourable impact on sales volumes.

1 mark per point, and for any other reasonable point

Total 7 marks

(ii)

- LTL could also undertake a competitor analysis to ensure its definitions are aligned with the market.
- If competitors' definitions are tighter, there is a risk anti-selection. Conversely, if competitors' definitions are more generous, there is a risk sales may reduce.
- The life insurance industry is in the business of paying claims. What is important is that there is consistency between the pricing basis and claims outcome. More specifically that incidence rates for heart attacks implicit in premium rates are aligned with actual claims rates.
- Analysing A/E split by reason for claim (if data is available) over several years would help to identify trends and demonstrate if best estimate assumptions need to be reviewed.
- LTL should consider what a policy holder would 'reasonably expect' in relation to their cover for heart attacks. LTL should recognise that majority of policy holders would not be aware of the finer details of their terms and conditions. To refuse claims based on what may be perceived by customers as a 'loophole' would create a reputational risk for LTL.
- Recent press relating to insurers declining claims provides an example of the reputational issues that can result from issues like this.
- Recent press suggests the Regulator is looking into conduct risk assessments around claims practices within the life insurance industry and so LTL should keep abreast of its findings so as to inform any decision it makes in relation to changing definitions.
- It is unlikely that policy terms and conditions would allow LTL to pass back a tightening of definitions to existing policyholders. The implication of this is that the change would not have an impact on claims for existing policy holders. Instead it would only impact claims for future new business.

1 mark per point, and for any other reasonable point

Total 7 marks

Total 30 marks (16 + 7 + 7)