QUESTION 1 **(19 Marks)**

You are the Appointed Actuary for Salt & Pepper Life, a major listed Life insurer based in Australia that sells Life policies solely through independent advisers via three commission structures:

a) Upfront commission with 120% for the first year and 10% thereafter
b) Hybrid commission with 60% for the first year and 18% thereafter
c) Level commission of 30%

A one year responsibility period applies to both Upfront and Hybrid commission where 100% of the commission on the first premium will be clawed back if the policy lapses.

60% of Salt & Pepper policies are sold via Upfront commission, 30% via Hybrid commission and 10% of Level commission.

Different commission structures have been accurately modelled but the lapse rate assumption does not currently differentiate on the type of commission.

Business is growing at a rapid rate and an ambitious sales plan has been implemented for the next few years. 30% of the portfolio is reinsured.

Salt & Pepper Life uses the Australian Margin on Services method to value its policy liabilities, and complies with the Australian LAGIC requirements set out by APRA.

The government has recently announced a commission reform package for the Life insurance industry to improve the quality of advice to consumers. The key changes are outlined below:

1. Maximum total upfront commission of 60 per cent of the premium in the first year of the policy, from 1 January 2016.
2. Maximum ongoing commission of 20 per cent of the premium in all subsequent years from 1 January 2016 (except for level commissions where no maximum commission rate is specified)
3. Three year responsibility period, to commence from 1 January 2016 to apply as follows:
   - In the first year of the policy, to 100 per cent of the commission on the first year's premium;
   - In the second year of the policy, to 60 per cent of the commission on the first year's premium;
   - In the third year of the policy, to 30 per cent of the commission on the first year's premium.
4. There is no responsibility period for level commission business.

a) Explain the likely impacts on Adviser behaviour in both the short and long term as a result of these changes?

(3 marks)

b) Explain how the key financial reporting metrics of the business will be impacted by the changes in Adviser behaviour Assume that there are no pricing or assumption changes made.

(8 marks)

c) The current lapse assumptions are based on duration (since policy commencement) only and apply to all life products and commission types. In response to the commission reform package, Salt & Pepper Life has decided to model lapse rates by commission types for the inforce business.

Both the current and the revised lapse assumptions are set out below. Assume no changes to model, pricing basis and claw back structure.

Current	Year 1	Year 2	Year 3	Year 4	Year 5+	All Durations
Aggregate	5%	20%	16%	16%	16%	17%

Revised	Year 1	Year 2	Year 3	Year 4	Year 5+	All Durations
Upfront	8%	21%	17%	17%	18%	18%
Hybrid	6%	16%	12%	12%	12%	13%
Level	4%	7%	8%	9%	10%	10%
Aggregate	5%	20%	16%	16%	16%	17%

After running the new lapse assumption through the policy liability model, it resulted in a large negative impact to PVPM for inforce business. What is the likely reason for this?

(2 marks)

d) From 1 January 2016, Salt & Pepper Life ceases Upfront Commissions and changes the hybrid commission structure to 60/20. They continue to offer level commission at 30%. Going forward, they expect all of the new business previously written as upfront commission to switch to the new hybrid structure.

Estimate the Value of New Business for 2016 assuming no changes are made to pricing or assumptions and explain the result.

The key inputs are listed below and you may assume a present value factor of 10 for renewal commission. Figures are in $millions. You may ignore GST. Shareholder profits are taxed at 30%.

	2015 full year forecast	2016 Plan
Annual premium sales	10	10
Initial Commission	?	?
PV of renewal commission	?	?
initial Expense	11	11
Value of NB	9	?

(6 marks)

MARKING GUIDE

a) Short Term

- In short term we'd expect to see increase in churn (the practice whereby advisers encourage policyholders to replace their existing policies with a similar policy so that they can collect the initial commission again) as advisers look to churn while they can.

- We might also expect to see increase in sales of upfront commission policies while advisers look to take advantage of higher upfront commissions.

- Generally might expect to see an increase in sales so that advisers can get in before the 3 year responsibility period starts.

Long Term

- In the longer term we'd expect to see less churn because of the longer responsibility period (the adviser can only churn policies that have been in force for 3 years or more) and reduced financial incentive (most they can get in year 1 is 60% versus 120% previously).

- Sales that would have previously be sold with upfront commission are more likely to be sold with hybrid commission going forward, rather than level commission, as advisers seek to move to the closest commission model.

- We might also see some advisers exit the market if they believe that will get higher remuneration in another industry (e.g. general insurance).

- If all life companies are operating on the same commission structure, then advisers can no longer use this as a factor when deciding which product to advise their client to buy (this should result in a better outcome for the client). They'll look for other factors (e.g. premium, benefits, customer service) to distinguish between life companies.

Up to 0.5 marks for each point to a maximum of 3 marks

b) Key financial reporting metrics of the business that will be impacted by the changes in Adviser behavior include sales, expenses, commission, lapses, claims, profit, capital position, value of new business & value of in force business.

Sales

The level of sales is impacted by policy counts and average premiums of new business.

- In the **short-term**, policy counts for Salt & Pepper are likely to increase (as advisers look to write as many policies before the commission structure change).

- In the **long-term**, policy counts could increase or decrease due to a combination of the following factors:
  - Assuming no change in share of adviser market & reduction in overall adviser market due to advisors exiting the market, would expect Salt & Pepper sales to decrease as Salt & Pepper only sells through adviser.
  - Sales would decrease due to decreasing churning activities.
  - Sales to increase, assuming increase in share of adviser market due to being competitive on non-commission factors & non change in overall adviser market.

- Average premiums may increase as Advisers seek higher net worth policies to increase their revenue – this could lead to an increase in sales.

(1 mark)

Expenses

- Variable expenses are linked to the sales volume and therefore will be affected by the change in sales volumes.

- Fixed expenses are reasonably independent of sales volume and therefore should be unaffected by the change in sales volumes.

- Expenses will generally be influenced by the commission structure change (any change costs money) but should be largely unaffected by the adviser behavior.

- There may be more emphasis on flat sponsorship payments to dealer groups instead of volume driven incentive arrangements (assuming these were also no allowed following the changes) and hence an impact on the expense assumptions (albeit overall outgo may be unchanged).

(1 mark)

Commissions

Initial commission will reduce & renewal commission will increase to reflect no longer selling upfront business (and replacing this with hybrid/level business).

(0.5 marks)

Lapses

- In the short-term, lapses for Salt & Pepper are likely to increase (as advisers look to churn while they still can).
- In the long-term, we'd expect to see lower lapses as a result of less churn.

(1 mark)

Claims

- Would expect no change in claim experience unless there was a change in mix of business as a result of the change in commission structure.

- However, the change in the level lapse rates would impact on claims due to the impact of selective lapsation. In the shorter term, customers moving to other providers due to increase churn activity would be the healthier lives in order to get through the underwriting process. The lives remaining would thus be less healthy and hence lead to an increase in claims experience.

- Lower lapse rates in the longer term should mean a reduction in selective lapsation and hence less deterioration in claims experience from this effect.

(1.5 marks)

Profit

The overall impact on profit will depend on the interaction of each of the items above. There is likely to be a reduction in profit in short term due to the increase in lapses but over the longer term there should be an improvement in profitability as lapse rates reduce to a lower level than before the implementation of the reform package.

(1.5 marks)

Capital

- The lower upfront commissions should lead to make writing new business less capital intensive.
- If reinsurance support is providing capital relief, then there is less need for this type of reinsurance going forward.

(1.5 marks)

Value of Inforce Business

Given that there are no assumption or pricing changes, there will be no immediate impact on VIF. In the short term, there may be some reduction due to increased lapsing.

(0.5 marks)

Value of New Business

- Value of new business is the present value of future profits from sales during the reporting period. It is driven by sales (more sales equals' higher value of new business assuming the business is profitable), expense assumptions (more expenses equals' lower value of new business), lapse assumptions (lower lapses equals' higher value of new business) and mix of business (selling more profitable business equals' higher value of new business) and other assumptions (such as claim & economic assumptions).

- Because we're assuming no change in assumptions, the key drivers are going to be sales & mix of business. Sales have been covered above.

- Short term or long term impact to Value of New Business will likely to be different.

- Changes to mix of business:

- No longer selling upfront commission policies. Where we're using the same lapse assumptions for all commission types, we'd have higher value of new business for upfront commission business (because of lower ongoing expenses). Therefore selling less upfront business should reduce value of new business.

(2 marks)

Other valid comments include impact on Policy Liabilities and volatility of profit

Marks as specified above and other valid points to a maximum of 8 marks

c) Changes in non-economic assumptions cannot change the policy liability. So any change in BEL is offset by a change in present value profit margins so that the overall policy liability is unchanged. **(0.5 marks)**

Different commission structures have different renewal commission. Although the overall lapse rate is unchanged, the reduction in renewal commission (because less policies in force) for upfront business will be more than offset by the increase in renewal commission (because more policies in force) for hybrid/level business.

(1 mark)

Another possible cause of the decline in the PVPM relates to the different level of outstanding deferred acquisition costs (DAC) for the three commission types. The Upfront and Hybrid commission structures have contributed to the DAC through their initial commissions. The expected recovery of this DAC will be impacted by the change in lapse rates. The small increase in the lapse rates of the Upfront business means that the recovery period is shortened causing a reduction in future profit margin. However this reduction will be offset by the Hybrid business where the larger reduction in lapse rates has extended the recovery period and thereby increased future profit margins. The degree of offset will also depend on the current DAC balance noting that this has been impacted by past lapse experience.

(0.5 marks)

Marks as specified above to a maximum of 2 marks.

0.5 marks deducted if proportion of different commission types is provided as an explanation (as the lapse assumption has been set so in aggregate it is the same).

d) Estimate of VNB

Value of New Business = PV Future Profits for new business written during the reporting period as at the reporting date

Value of New Business = [PV Premiums – PV Claims – PV Renewal Expense – PV Renewal Commission – Initial Commission – Initial Expense]*(1-30%)

2015 full year forecast

Initial Commission = 10*60%*120% + 10*30%*60%+10*10%*30% = 7.2 + 1.8 + 0.3 = 9.3

1 Yr Renewal Commission = 10*60%*10% + 10*30%*18% + 10*10%*30% = 0.6 + 0.54 + 0.3 = 1.44

PV Renewal Commission = 1.44 *10 = 14.4

Value of New Business = 9

9 = [PV Premiums – PV Claims – PV Renewal Expense – 14.4 – 9.3 – 11]*(1-30%)

[PV Premiums – PV Claims – PV Renewal Expense] = 9/(1-30%) + 14.4 + 9.3 + 11 = 12.86 (to 2 dp) + 14.4 + 9.3 + 11 = 47.56

Check Value of New Business = [47.56 – 14.4 – 9.3 – 11]*(1-30%) = 9

2016 Plan

Initial Commission = 10*90%*60% + 10*10%*30% = 5.4 + 0.3 = 5.7

1 Yr Renewal Commission = 10*90%*20% + 10*10%*30% = 1.8 + 0.3 = 2.10

PV Renewal Commission = 2.10 * 10 = 21.0

PV Premiums – PV Claims – PV Renewal Expense = 47.56 (because no other assumptions have changed).

Value of New Business = [47.56 – 21.0 – 5.7 – 11]*(1-30%) = 6.9(to 2 dp).

Completed Table

	2015 full year forecast	2016 Plan
Annual premium sales	10	10
Initial Commission	9.3	5.7
PV of renewal commission	14.4	21.0
Initial Expense	11	11
Value of NB	9	6.9

Explanation

VNB has reduced as a result of the introduction of the new commission structure. This is because the reduction in Initial Commission is more than offset by the increase in PV Renewal Commission (so while we're paying lower initial commission we're paying more renewal commission in the long term) where all other assumptions remain equal. **(1 mark)**

This result is sensitive to the choice of PV Factor for Renewal Expenses. If the PV Factor is reduced below a certain level then the VNB in 2016 would be higher (all else being equal). **(1 mark)**

If we also changed our lapse rate assumptions (to use different lapse rates by commission structure) we might expect overall value to increase as the aggregate lapse rate reduces (the lapse rate for upfront is significantly higher than for hybrid & level). A positive VNB means that we're making profits off this business and reducing the lapse rate would mean we expect to make profits for longer (therefore increasing value). **(1 mark)**

Calculation, 3.5 marks and 0.5 marks deducted for each error. Alternative approaches that lead to the correct completed table get full marks.

For the explanation, marks as specified above plus any other valid points.

To a maximum of 6 marks.

QUESTION 2 **(20 Marks)**

You are the life insurance valuation actuary of Fork & Knife Life Insurance Company (Fork & Knife Life). The company has just entered the Life insurance market of New Polenta and intends to sell stepped premium term insurance business with the following features:

- Automatic indexation of the sum insured each year at a rate of 2%
- No rider benefits
- Term expires at age 65.

New Polenta uses the Australian Margin on Services method to value its policy liabilities and complies with the Australian LAGIC requirements set out by APRA.

a) You have pulled together a simple example showing cashflows for a typical policy.

A model has been set up to project the Policy Liability and Profits for a typical policy (male, non-smoker, age 56 next birthday) with a Sum Insured of $250,000.

The following assumptions apply (also provided in the spreadsheet).

Expense Assumptions

Initial Expenses	$350	per policy
Renewal Expenses	$75	per policy
Initial Commission	70%	of premium
Renewal Commission	5%	of premium

Economic Assumptions

Expense Inflation	2%
Risk Free Discount Rate/Cash Earnings Rate	7%

Other Assumptions

Lapse Rate	15%
Mortality	100% of IA90-92

You have assumed that:

- Premiums are paid at the start of each year;
- Commissions are paid at the start of each year;
- Claims are paid at the end of the year;
- Expenses are incurred at the same time as their underlying driver.
- For the purposes of this exercise, that at 31 December 2015, Fork & Knife Life has total assets (cash at bank) of $1000 with nil policy liability and other liabilities of $100.

Project the balance sheet for the next two years based on this single policy sold at the beginning of 2016 and explain the movements in Equity.

(6 marks)

b) Many years later, Fork & Knife Life has developed a large inforce book of stepped premium term business. Whilst conducting the annual lapse investigation, you have uncovered a large proportion of your lapses were due to policyholders requesting a change to one of the policy terms & conditions resulting in the policy being cancelled and a new policy being issued. This is known as a "cancel-replace".

In these situations, no upfront commission is paid again. As such, the cancellation of the old policy results in higher recorded lapses and higher recorded sales.

i) Based on your current model, assume the policy is cancel-replaced resulting from a change in their adviser code, at the end of year 3. Assume there are no other changes to the policy terms and conditions. Calculate the new profit margin for the remaining seven years of cash flows for this policy.

Use the new profit margin calculated above to project the future policy liabilities and gross profits (for year 3 and onwards) and complete the analysis below.

Analysis of cancel-replace Impact	
PV Profit Margin Release - Life of the Policy	
No Cancel-Replace	$947
Cancel-Replace	
PV profit releases	?
PV Negative PL lost	?
Total	?
Interest on negative PL	
No Cancel-Replace	?
Cancel-Replace	?
Difference	?
Total PV Profit	
No Cancel-Replace	?
Cancel-Replace	?
Difference	?

(9 marks)

ii) Based on the results above, draft a response to the CFO, who is not an actuary, explaining the impact on the emergence of profit over the life of the policy resulting from a cancel-replace. Also comment on the impact on the present value of total profits.

(5 marks)

Spreadsheet: 2B_Exam_2015_Sem_2_Q2

MARKING GUIDE

a) The projected balance sheet is as follows:

	Dec-15		Dec-16		Dec-17	
Assets	**$**	**1,000**	**$**	**74**	**$**	**352**
Cash at bank	$	1,000	$	74	$	352
Liability	**$**	**100**	**-$**	**1,044**	**-$**	**996**
Policy Liability	$	-	-$	1,144	-$	1,096
Other liability	$	100	$	100	$	100
Equity	**$**	**900**	**$**	**1,118**	**$**	**1,348**
Shareholder Retained Profits	$	900	$	900	$	1,118
Profit	$	-	$	218	$	229
Change in Equity			**$**	**218**	**$**	**229**
Trial Balance			**$**	**-**	**$**	**-**

Profit Breakdown		$	218	$	229
Inv return on Cash at bank		$	70	$	5
Profit Margin release		$	148	$	144
Int on -ve Pol Liab		$	0	$	80

The movement in Equity can be broken down into three components:

- Investment return during the year on physical assets (in this case cash at bank). Physical assets that incurs interest = Physical assets at the beginning of the year + cashflows as a result of selling the policy.
- Profit margin release for selling this policy.
- Interest on negative policy liability.

Projection
Marks awarded 4.5

0.5 marks deducted per error (but not penalised twice for the same error). If the trial balance does not equal zero and no comment is made on this, a full mark is deducted. If a comment is made that it should be zero, 0.5 marks deducted.

An approach to applying interest to Other Liabilities is also acceptable (as long as appropriate adjustments have been made elsewhere so that there is no impact on the trial balance).

Explanation
A maximum of 1.5 marks awarded for a good explanation of the components of the movement in Equity.

b)

i) The new profit margin based on the rest of the cash flows is 24.8% which is higher due to the absence of large initial commission.

Calculations

PV cash flows	$1,723
Profit margin %	24.8%

Year	Premium	Investment Income (on cash flow)	Death outgo	Expense	Commission	**Net Cash flow**	BEL eoy	Value of future profit margins eoy	Policy liability eoy	**Change in policy liability**	Gross Profit	Profit Margin Release	Interest on negative Pol Liab	Interest on negative PolLiab plus PM with interest	Check error
							- 947	947	- 0						
1	1,383	5	1,065	350	968	**-996**	- 2,009	865	- 1,144	**- 1,144**	148	148	0	148	0
2	1,342	85	1,023	65	67	**272**	- 1,877	781	- 1,096	**48**	224	144	80	224	0
3	1,309	83	985	56	65	**286**	- 1,723	696	- 1,027	**69**	-810	140	77	217	-1,027
4	1,280	82	949	48	64	**300**	- 1,543	**1,503**	- 40	**- 40**	340	340	0	340	0
5	1,246	80	916	42	62	**306**	- 1,345	**1,277**	- 68	**- 28**	334	331	3	334	0
6	1,224	79	886	36	61	**321**	- 1,119	**1,041**	- 78	**- 10**	330	325	5	330	0
7	1,198	78	858	31	60	**327**	- 870	**795**	- 74	**3**	324	319	5	324	0
8	1,168	76	829	26	58	**330**	- 601	**541**	- 60	**14**	316	310	5	316	0
9	1,142	74	802	23	57	**335**	- 309	**275**	- 33	**27**	308	303	4	308	0
10	1,107	72	775	19	55	**330**	-	**-**	-	**33**	297	294	2	297	0
NPV @ yr 3 EoP	$6,935		$4,673	$193	$347						$1,095	$1,785	$148	$1,933	

Analysis of Cancel-Replace Impact	
PV Profit Margin Release - Life of the Policy	
No Cancel-Replace	$947
Cancel-Replace	
PV profit releases	$1,785
PV negative PL lost	-$839
Total	$947
Interest on negative PL	
No Cancel-Replace	$347
Cancel-Replace	$148
Difference	*$200*
Total PV Profit	
No Cancel-Replace	$1,294
Cancel-Replace	$1,095
Difference	*$200*

2 marks for profit margin calculation, 3 marks for projection and 4 marks for completion of the analysis.
Marks awarded for other reasonable approaches to this question.
Additional marks may be awarded for other sensible comments (e.g. lapse rate assumption impacts).

ii)
To: CFO, Fork & Knife Life

From: Life Insurance Valuation Actuary, Fork & Knife Life

RE: Impact on emergence of profit over the life of the policy resulting from a cancel-replace.

Dear CFO,

As part of our annual lapse investigation work, a noticeable increase in the number of policies that are being cancelled and replaced has been observed.

These policies have the following characteristics:

- A change in policy terms & conditions were requested by the policyholder resulting in the policy being cancelled and a new policy being issued.
- No upfront commission is paid again.
- As such, the cancellation of the old policy results in higher recorded lapses and higher recorded sales

Impact on profit emergence
I have performed some analysis of the impact based on a typical policy, assuming the cancel replace to happen at the end of policy year 3.

As a result of the cancel-replace, the policy has a loss at the end of year 3, reflecting the upfront commission costs not being recovered.

From year 4 onwards, the profit emergence pattern is similar to that of a level-commission policy, with a higher profit margin (24.8%) compared to the original policy (10%).

In other words, a loss will be recorded at the end of year 3, followed by high profit levels in the remaining 7 years.

Impact on present value of total profits
Total present value of profit is equal to the present value of profit margin release plus interest on DAC asset.

Cancel and replace activity has no impact on the present value of profit margin release as policy cash flows are not affected and profit margin will reset. The present value of total profit emerging from profit margin release would stay the same. (at $947 in this example).

However, the PV of interest earned on negative policy liabilities would reduce (by $200 for a typical policy), reflecting the deferred acquisition costs being written-off at the end of year 3. As a result, the PV of total profit would reduce (by $200 for a typical policy).

Please free to give me call if you wish to discuss further on this matter.

Kind regards,

A. Actuary

Up to 4 marks awarded for the explanation, 0.5 marks awarded for the use of appropriate language and 0.5 marks awarded for setting the response in an appropriate structure.

Spreadsheet: 2B_Exam_2015_Sem_1_Q1_Solution

QUESTION 3 **(21 Marks)**

You are the Appointed Actuary of Steak & Kidney Life Insurance Company (Steak & Kidney Life), based in Australia. Steak & Kidney Life has an established book of YRT business and two small books of business in run-off, Lifetime and Term Certain Annuity business (both closed to new business ten years ago).

The small book of legacy lifetime annuity policies are administered and valued manually in spreadsheets. The Term Certain Annuity policies are fully built into the policy administration system.

Given the increased focus in Retirement benefit solutions, Steak & Kidney Life is investigating the opportunity of re-entering the lifetime annuity market, which is currently dominated by Cookies & Cream Life. Cookies & Cream Life specialises annuity business and does not sell any Risk business.

Steak & Kidney Life uses the Australian Margin on Services method to value its policy liabilities. As such, it carries a large negative policy liability for its Risk business. Both Steak & Kidney and Cookies & Cream follow the APRA LAGIC capital standards.

Steak & Kidney Life have just appointed a new CEO, who has a finance background but is not an Actuary.

a) The CEO has asked you to explain the issues to be considered and the risks involved in re-entering the lifetime annuity market. Draft your response to the CEO and suggest how each of the risks could be mitigated.

(9 marks)

b) Explain how the level of regulatory capital required for Steak & Kidney Life's new lifetime annuity book could differ from the current annuity market leader, Cookies & Cream Life?

(6 marks)

c) Steak & Kidney has an existing Target Surplus policy which considers each of the key risks to the capital position separately, determining a 97.5% probability of sufficiency over 12 months.

The CEO has also asked what the key considerations are for determining the Target Surplus methodology to allow for the introduction of lifetime annuity business. Set out the points you would include in your response to the CEO.

(6 marks)

MARKING GUIDE

a)
Dear CEO,

I am writing to you setting out the key risks and issues that need to be considered in re-entering the lifetime annuity market. These are set out below along with some suggested mitigations for each of the risks.

Longevity risks
This is the risk that people live longer than we have assumed when setting the premium rates
- Reduce the risk through reinsurance
- Reduce the risk through product design. E.g. fixed term annuity/ term certain annuity with guaranteed benefits for a chosen term.
- Longevity risk is a natural hedge against our existing term business (and we should consider cross-sell opportunities for the annuity product to our existing YRT policy owners).
- Need to consider the demographic profile of the target market

(2 marks)

Asset liability mismatch risks
This is the risk that arises when the assets are mismatched with the liabilities
- The asset selection needs to be carefully considered with matching the underlying liability duration in mind.
- It may be difficult to find sufficiently long dated bonds to match the long tailed nature of the annuity liabilities

(1 mark)

Operational/Administration risks
This is the risk that errors occur due to operational or administrative issues. The existing process for administering the legacy book of lifetime annuities is manual and spreadsheet based.
- It is likely that we need to invest and upgrade our administration system. The cost may be prohibitive and hence need to a more comprehensive cost/benefit analysis.
- There will be significant resourcing requirements both in the short term to develop the capability to develop the product, pricing and distribution of the new Lifetime Annuity business and to administer going forward. There is a risk that there isn't sufficient resourcing and that management attention is diverted.
- Need to develop a clear and achievable project management plan, and may need to seek external consulting support.
- Critical to involve all relevant stakeholders early on to ensure concerns are addressed
- Given that the existing Term Certain Annuity business already has a robust policy administration system, then this could be adapted to administer Lifetime annuity business going forward.

(3 marks)

New Business and Expense risks
It may not be possible to get sufficient volumes of sales to support overhead costs and initial project costs.
- Need to conduct a cost and benefit analysis.

- Currently Cookies & Cream dominates the annuity market. We need to assess the likelihood of being able to compete for a share of the market (through competitive pricing or product differentiation). There is a risk that we do no attract sufficient sales for this product to be viable.
- Success will also depend on a significant change to the legislative environment for annuities, in particular the tax treatment.

(2 marks)

Risk Appetite/Capital Considerations
Higher capital support will be required as lifetime annuities are exposed to longevity risk and asset liability mismatch risk and well as to fund the investment required to launch this product and build the systems to administer going forward (as set out above).

- The source of this additional capital will need to be determined.
- Need to consider use of reinsurance to reduce some of the capital requirements.
- Capital projections and stress testing would be necessary and considered as part of a broader ICAAP considerations.
- Need to consider Steak & Kidney's Risk management framework and Risk appetite and engage with the Board to consider how this proposal fits in with these.

(2 marks)

Please let me know if you would like to discuss these further.

Regards,

Ann Appointed Actuary

Mark as specified above and up to 1 mark each for any other valid issues (where not effectively covered in the above categories and also only where they are related back to the question).

0.5 marks for the use of appropriate language and 0.5 marks for setting the response in an appropriate structure

To a maximum of 9 marks.

b)

Insurance Risk Charge Diversification
Steak & Kidney future capital requirement will benefit greatly due to its natural hedge against the existing mortality risk which will result in less insurance risk charges as a result of the prescribed diversification matrix in LPS115 paragraph 42. **(1 mark)**

Capital Base Synergy
Steak & Kidney future capital base will be greatly enhanced as a result of selling both annuity and YRT business. This because:

- Both the YRT and annuity business are part of the same product group (non participating benefits without entitlement to discretionary additions) for capital calculation.
- Policy liability for annuity business will be positive due to large initial instalments
- Adjusted policy liability for annuity = max (CTV , RFBEL) according LPS 360 paragraph 10 (d).
- Policy liability for annuity business > its RFBEL (assuming positive profit margin), hence, result in an increase in capital base after allowing for the difference between policy liability and adjusted policy liability.
- LPS 360 paragraph 10 d) CTV for annuity cannot be less than risk free best estimate liability
- Liability adjustment to capital base (reduction) from YRT will be offset by a liability adjustment to capital base (increase) from annuity. Large negative policy liability of YRT business will be offset by the positive policy liability from annuity business, hence result in capital benefits from selling both YRT and annuity business.
- An example is given below to illustrate the capital benefits from selling both annuity and YRT business to its capital base calculation.

$k	YRT	Annuity
PL	-110	12
RFBEL	-100	10 (originally 15 but RFBEL = CTV)
CTV	15	10
Adjusted policy liability	15	10
Liability Adjustment to Capital base	110+15=125	-2

Therefore, by having YRT business, Steak & Kidney Life's capital requirements $2k lower than if they didn't hold YRT business. **(Up to 4 marks)**

Operational Risk Charge
This depends on the premium growth in the reporting period. Given that we are introducing a new product, the growth would be expected to be large in the short term hence increasing the operational risk charge. **(1 mark)**

Supervisory Adjustment
Given that this is a new product, APRA may prescribe a supervisory adjustment to capture the business risks not adequately allowed for in the standard capital calculations, if it perceives the strategy as risky. This will increase the total capital requirement.
(1 mark)

Mark as specified above and up to 1 mark each for any other valid reasons but only where they are related back to the question (e.g. just saying that the asset risk charge could be different because the investment strategy may be different scores no marks)

To a maximum of 6 marks.

c)
The points to include in my response to the CEO are as follows:

- The Target Surplus methodology will need be reviewed in light of the introduction of lifetime annuity business. As the Board owns the Target Surplus policy, it is important to communicate the change effectively.

- There are many different views over the definition and evaluation of Target Surplus (Board vs management vs regulator vs industry). The revised policy and calculation method needs to balance each stakeholder's interest.

- Steak & Kidney's Target Surplus is currently defined as the amount of assets to be held within Steak & Kidney's shareholder and statutory funds in excess of the Prudential Capital Requirement such that Steak & Kidney can continue to meet the Prudential Capital Requirement over the next 12 months to a confidence level of 97.5%. The management may want to revisit this definition taking into account the new risks to reassess what level of additional comfort is the Target Surplus intended to provide. The following factors will need to be considered:
    - The time period over which the Target Surplus is deemed to provide comfort to the company's regulatory position.
    - Probability of sufficiency of continuing to meet the regulatory capital requirement over the defined time horizon.
    - What risks needs to be included
    - The ability of the Company to raise capital and the timeframes involved.

- The methodology should consider the following risk associated with selling lifetime annuity business.
    - Longevity risk, administration/operational risk, asset liability mismatch risk, new business risk.

- For longevity risk, the target surplus should account for the impact of adverse changes to assumed level of mortality. Target surplus can be determined by stressing the regulatory balance and assessing the change in excess assets position over 12 months. The change in profits, the Capital Base, and Prescribed Capital Requirement (PCR) is modelled separately for the stressed longevity risk.

- For administration risk, the target surplus should allow for the impact of failure of the company's new/old administration process on Lifetime annuity. Different scenarios of possible process failure should be considered, and assessed separately.

- For asset liability mismatch risk, it can be quantified in the same way as for the longevity risk. The severity of the stresses can also be determined in the same way as for longevity risk – that is by scaling down the LAGIC stresses.

- For new business risk, the target surplus should allow for the risk of required capital being higher than expected due to unanticipated new business sales.
- Diversification between different risks needs to be considered and incorporated appropriately. For example, having both mortality and longevity risks on the book. Allowance should be made for future mortality improvements, and how these will impact different cohorts of policyholders. The hedge between the longevity of the older age annuitants may not be a perfect hedge to the younger life insurance policyholders.

1 mark for each point to a maximum of 6 marks.