8. (2.25 points)

Given the following information about an insurance product filing with annual policies:

- 2018 projected pure premium = $350.
- Loss cost annual trend = 3%.
- Premium annual trend = 4%.
- Fixed expense per exposure, new business = $50.
- Fixed expense per exposure, renewals = $6.
- Variable expense ratio = 18%.
- Profit and contingencies provision = 6%.
- LAE provision = 10% of loss.
- Retention ratio = 80%.
- Discount rate = 5%.

a. (1.5 points)

Calculate the new business premium per exposure for 2018 indicated by a lifetime value analysis using a two-year time horizon.

b. (0.75 point)

Fully justify the use of lifetime value analysis in a rate indication using the Statement of Principles Regarding Property and Casualty Ratemaking.

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QUESTION 8

TOTAL POINT VALUE: 2.25 | **LEARNING OBJECTIVE(S): A5, A6**

SAMPLE ANSWERS

Part a: 1.5 points

Sample 1

Year	Loss Cost+LAE	Fixed Expense	Variable Expense
1	350 x 1.1 = 385	50	0.18P
2	1.1 x 350 x 1.03 = 396.55	6	0.18 x 1.04P

Premium	Profit	Net Cost
P	0.06P	P – 0.06P – 0.18P – 385 – 50 = 0.76P – 435
1.04P	0.06 x 1.04P	1.04P – 0.0624P – 0.1872P – 402.55 = 0.7904P – 402.55

0.76P – 435 + 0.8/1.05(0.7904P – 402.55) = 0
0.76P – 435 + 0.602P – 306.70 = 0
Premium = 544.57

Sample 2

	1	2
PP	350	360.5
FX	50	6
LAE	35	36.05
	435	402.55

(435 + 402.55 x 0.8/1.05)/(1 – 0.18 – 0.06) = 975.93
975.93 = X (1 + 0.8 x 1.04/1.05)
X = 544.49

Sample 3

	Pure Premium	fixed expense	retention ratio	discount rate	lae factor
2018	350	50	1	1	1.1
2019	350 x 1.03 = 360.5	6	80%	0.95	1.1

	Adj pure prem	adj fixed expense
2018	385	50
2019	301.4	4.56
Total	686.4	54.56

(686.4 + 54.56)/(1 – 18% – 6%) = 974.9
P + P x 1.04 x 80% x 0.95 = 974.9
P = 544.5

Part b: 0.75 point

Sample 1

1. A rate is an estimate of the expected value of future costs
   -Life time value looks at future costs and profit

2. A rate provides for all costs associated with the transfer of risk
   -Life time value looks at the current cost and how future profit makes up for that
3. A rate provides for all costs with an individual risk transfer
   -same as 2, but looking at individual policies
4. A rate is reasonable and not excessive, inadequate, or unfairly discriminatory if it is an actuarially sound estimate of the expected value of all future costs associated with an individual risk transfer
   -life time value takes future and current data into consideration

Sample 2

Life time value analysis considers all current and future expected costs over the life time of the policy. It allows the actuary to incorporate assumptions about retention ratio and difference in loss experience between new and renewal business to assess the present value of all future expected costs for the life time and the insured with insurer and not just on average. This can help make the rate more equitable and fair.

Sample 3

1. Life time value analysis prices to cover expected costs over the life time of a policy, so it meets this principle from a long term view
2. Life time value analysis prices according to the overall cost of transfer of risk in aggregate, as it prices to be profitable over all policies in the long term, thereby covering cost of risk transfer
3. Life time value analysis prices according to individual transfer of risk, as prices are set according to the expected individual cost of a policy over the policy's life time
4. Life time value analysis is not unfair or discriminatory as it is based on actuarial analysis including assumptions of persistency

EXAMINER'S REPORT

Candidates were expected to understand premium calculations consisting of all components including loss cost, LAE, fixed expenses, variable expenses and profit load including how the loss cost trend, retention ratio, discount factor and premium trend are applied on each component.

Candidates were also expected to know the statement of principles on ratemaking and to be able to connect the real life example with the principles.

Part a

Candidates were expected to know how to apply an LAE factor on loss cost to get pure premium, the required premium calculation formula, and how to apply loss trend, retention, discount factor and premium trend on 2nd year premium and premium components.

Common errors included:

- Not including LAE into loss cost
- Not applying retention ratio or discount on 2nd year indicated present value premium

- Not applying retention ratio or discount on fixed expenses
- Including premium trend in 2nd year indicated present value premium calculation
- Not including premium trend when calculating the 1st year premium

Part b

Candidates were expected to know the principles of statement for ratemaking and how to connect the real life ratemaking example to these principles.

Common errors included:

- Knowing the principles but not being able to connect with the real life example
- Knowing what the real life example does for ratemaking but not being able to connect with principles