10. (2.75 points)

Given the following information for the rating variables vehicle class, driver type, and territory:

Exposures	Territory		
Vehicle Class	1	2	3
A	30	15	200
B	80	22	104
C	20	80	60

Exposures	Territory		
Driver Type	1	2	3
X	50	45	140
Y	80	72	224

Loss ($000s)	Territory		
Vehicle Class	1	2	3
A	30	15	200
B	100	33	135
C	30	200	105

Loss ($000s)	Territory		
Driver Type	1	2	3
X	40	65	115
Y	120	180	325

- All segments are fully credible.
- Vehicle class A, Driver type X, and Territory 1 are used as the bases.

Propose rating factors for all three variables using a univariate method, considering any exposure correlation.

CONTINUED ON NEXT PAGE

QUESTION 10

TOTAL POINT VALUE: 2.75 | **LEARNING OBJECTIVE(S): A8**

NOTE FROM THE SYLLABUS AND EXAMINATION COMMITEE

There was an inconsistency in the question, where the total losses for Territory 2 across vehicle class and driver type were not equal. This was unintended. The question was still possible to answer using either vehicle class or driver type for the territory analysis.

SAMPLE ANSWERS

Sample 1

For territory, I find the distribution of driver type is same in each territory, so I assume territory and driver type is not correlated, so the rating factors:

Territory 1: $\frac{120+40}{50+80}$= 1.2308 Territory 2: $\frac{65+180}{45+72}$= 2.094 Territory 3: $\frac{115+325}{140+224}$= 1.2088

	1	2	3
Rebased:	1	1.7013	0.9821

	X	Y
Driver X: 0.9362 Y: 1.6622 Rebased:	1	1.7755

Adjusted exposure for vehicle class:
A: 30*1 + 15*1.7013 + 200*0.9821 = 251.96
B: 219.57
C: 215.03

So the relativity of vehicle class is: 0.9725 1.2206 1.5576
Rebased: 1 1.2551 1.602

Sample 2

Driver Type	Exp	Loss	Pure Prem	Ind Rel
X	235	220	936.17	1.0
Y	376	625	1662.2	1.776
		845		

Veh Class	Exp	Loss	Pure Prem	Ind Rel
A	245	245	1000	1.0
B	206	268	1300.97	1.301
C	160	335	2093.75	2.094
		848		

Territory	Exp (1)	Wtg Avg Driver Type Fac (2)	Wtd Avg Veh Class Fac (3)	Adj Exp (4) = (1)(2)(3)	Loss	Pure Prem	Ind Rel
1	130	1.4775	1.3535	259.97	160	615.46	1.0

B	117	$\frac{45+72(1.776)}{45+72} = 1.4775$	1.8046	311.96	248	794.97	1.292
C	364	1.4775	1.2663	681.03	440	646.08	1.050

Loss tables didn't match Used Terr x Veh Class Table

Sample 3

I will attempt to perform sequential analysis starting with the vehicle class variable, then perform adj. pure premium on the other 2 variables

Vehicle Class	Loss	Exposures	Relativity to Class A
A	30+15+200=245	245	1.0
B	268	206	1.301
C	335	160	2.0938
			1.3078

Vehicle class & terr (Ad. Pure premium on territory)

Territory	Adj. Exposures)	Loss	Pure Prem	Relativity to Terr 1
1	30*1.0+80*1.301+20*2.0938=30+104+42+176	160	0.9091	1.0
2	211	248	1.1754	1.293
3	461	440	0.9544	1.05

Adj. Pure Prem on driver type

Driver Type	Adj. Exposures)	Loss	Pure Prem	Relativity to Driver X
X	50*1.0+45*1.293+140*1.05=255	220	0.863	1.0
Y	408	625	1.532	1.776

EXAMINER'S REPORT

Candidates were expected to recognize exposure correlations across rating variables and demonstrate how to adjust for correlations using univariate analysis.

Common mistakes included:

- Performing univariate analysis on rating variables, ignoring exposure correlations
- Using loss tables rather than exposure tables in developing exposure adjustment weights
- Using loss relativities rather than pure premium relativities in the analysis
- Incorrect weights used for exposure adjustment
- Incorrect application of sequential analysis