11. (3.75 points)

Given the following information about 10 risks for a manufacturing class:

Risk	Type of Manufacturing	Manual Premium	Losses	Current Modification	Proposed Modification
1	Uses Robots	1,000	500	0.65	0.50
2	Uses Robots	1,000	600	0.75	0.55
3	Made by hand	1,000	700	0.70	0.70
4	Uses Robots	1,000	800	1.00	0.75
5	Uses Robots	1,000	900	0.90	0.95
6	Made by hand	1,000	1,100	1.15	1.05
7	Uses Robots	1,000	1,200	1.10	1.25
8	Made by hand	1,000	1,500	1.25	1.50
9	Made by hand	1,000	1,600	1.20	1.75
10	Made by hand	1,000	1,800	1.30	2.00

a. (3 points)

Evaluate the proposed experience rating plan compared to the current plan.

b. (0.75 points)

Evaluate the classification plan for this class.

CONTINUED ON NEXT PAGE

QUESTION: 11

TOTAL POINT VALUE: 3.75 | **LEARNING OBJECTIVE(S): B4,A1**

SAMPLE ANSWERS

Part a: 3 points

Sample 1:

Group risks into quintiles, ordered by Modification.

Quintile	Current	Proposed
1	1,3	1,2
2	2,5	3,4
3	4,7	5,6
4	6,9	7,8
5	8,10	9,10

Calculate Manual and Standard Loss Ratios by group.

	Manual	
Quintile	Current	Proposed
1	0.60	0.55
2	0.75	0.75
3	1.00	1.00
4	1.35	1.35
5	1.65	1.70

Standard	
Current	Proposed
0.89	1.05
0.91	1.03
0.95	1.00
1.15	0.98
1.29	0.91

The manual loss ratios under the proposed plan are more dispersed than under the curren
Therefore, the proposed plan is better at identifying risk differences.
The standard loss ratios under the proposed plan are closer to 1 (or show less variance) tha
the current plan. Therefore, the proposed plan is better when comparing standard loss rat
Overall, the proposed plan is better. However, the proposed plan does show a decreasing
standard loss ratio which suggests that the proposed plan puts too much credibility on exp

Sample 2:

Current Plan

Risk	Man LR	Std LR
1	50%	76.9%
3	70%	100.0%
2	60%	80.0%
5	90%	100.0%
4	80%	80.0%
7	120%	109.1%
6	110%	95.7%
9	160%	133.3%
8	150%	120.0%
10	180%	138.5%

Proposed Plan

Risk	Man LR	Std LR
1	50%	100.0%
2	55%	109.1%
3	70%	100.0%
4	75%	106.7%
5	95%	94.7%
6	105%	104.8%
7	120%	96.0%
8	150%	100.0%
9	160%	91.4%
10	180%	90.0%

In the current plan, the manual loss ratios are not monotonically increasing which is a problem. The proposed plan does not have this, therefore it is the better plan. Looking at the standard loss ratios, the proposed plan is generally closer to 1, while the current plan shows much more variation from 1, therefore the proposed plan corrects for differences in manual loss ratio better. The current plan has a decreasing trend in standard loss ratios which means the plan may be assigning too little credibility, while the proposed plan may be assigning too much credibility as can be seen by the decreasing trend in standard loss ratios.

Sample 3:

Rank by Current Mod

Risks	Man Prem	Losses	Man LR	Std LR
1, 3	2,000	1,200	60%	88.9%
2, 5	2,000	1,500	75%	90.9%
4, 7	2,000	2,000	100%	95.2%
6, 9	2,000	2,700	135%	114.9%
8, 10	2,000	3,300	165%	129.4%
		Variance	0.1486	0.0248
	Test Stat = Var(Std LR) / Var(Man LR) =			0.1670

Rank by Proposed Mod

Risks	Man Prem	Losses	Man LR	Std LR
1, 2	2,000	1,100	55%	104.8%
3, 4	2,000	1,500	75%	103.4%
5, 6	2,000	2,000	100%	100.0%
7, 8	2,000	2,700	135%	98.2%
9, 10	2,000	3,400	170%	90.7%
		Variance	0.1706	0.0025
	Test Stat = Var(Std LR) / Var(Man LR) =			0.0144

Based on the efficiency test the proposed plan has a lower test statistic therefore it is the better plan.
The proposed plan does have a downward trend in the standard loss ratio indicating it is giving too much credibility. The current plan has the opposite problem. Based on this the proposed plan is still superior.

Sample 4:

Using the Meyers Efficiency Test, choose the plan with the lowest test statistic, where the test statistic is defined as:
Test Statistic = Variance (Modified Loss Ratios) / Variance (Manual Loss Ratios)
Current Plan:

Risk	Manul Prem	Losses	Man LR	Mod	Std LR
1	1,000	500	50%	0.65	76.9%
3	1,000	700	70%	0.70	100.0%
2	1,000	600	60%	0.75	80.0%
5	1,000	900	90%	0.90	100.0%
4	1,000	800	80%	1.00	80.0%
7	1,000	1,200	120%	1.10	109.1%
6	1,000	1,100	110%	1.15	95.7%
9	1,000	1,600	160%	1.20	133.3%
8	1,000	1,500	150%	1.25	120.0%
10	1,000	1,800	180%	1.30	138.5%

Variance (Std LRs)	0.0431
Variance (Man LRs)	0.1801
Test Statistic	0.2395

Proposed Plan:

Risk	Manul Prem	Losses	Mod	ManLR	Std LR
1	1,000	500	0.50	50%	100.0%
2	1,000	600	0.55	60%	109.1%
3	1,000	700	0.70	70%	100.0%
4	1,000	800	0.75	80%	106.7%
5	1,000	900	0.95	90%	94.7%
6	1,000	1,100	1.05	110%	104.8%
7	1,000	1,200	1.25	120%	96.0%
8	1,000	1,500	1.50	150%	100.0%
9	1,000	1,600	1.75	160%	91.4%
10	1,000	1,800	2.00	180%	90.0%

Variance (Std LRs)	0.0036
Variance (Man LRs)	0.1801
Test Statistic	0.0201

By the efficiency test, the proposed plan has the lower test statistic, therefore this plan is preferred over the current plan. Note that we could have also looked solely at the variance of the modified loss ratios, as the denominator in the test statistics is identical.

Looking at the standard loss ratios when the risks are ranked by the mods, we can see a clear increasing trend in the standard loss ratios in the current plan. This implies the current plan is not assigning enough credibility to the actual risk experience. Looking at the proposed plan, the trend is not as pronounced, but there is a small decreasing trend in the standard loss ratios when ranked by the proposed mods. This implies the proposed plan is assigning too much credibility to the actual risk experience.

EXAM 8 FALL 2016 SAMPLE ANSWERS AND EXAMINER'S REPORT

Part b: 0.75 point

- Robots average loss = 800, Made by hand average loss = 1340. It is apparent that the average loss for made by hand is higher than robot. The plan is not doing a good job in differentiating the loss potential between the two types of manufacturing. The made by hand class should be charged a higher manual rate.
- Risks that use robots consistently have lower mods than made by hand risks. Class may not be granular enough. Should consider splitting into two classes by manufacturing type if there is enough credibility to have two smaller classes.

EXAMINER'S REPORT

Candidates were expected to demonstrate knowledge of classification plans and experience rating plans and how to evaluate different plans.

C Common mistakes include:

- Misunderstanding the class structure
- Not providing full evaluations of the experience rating plan and/or classification plan.

Part a

Candidates were expected to demonstrate the ability to compare two experience rating plans.

A number of approaches were allowed for full credit including the efficiency test and quintiles test.

Common mistakes include:

- Not assigning risks to the correct quintile.
- Not addressing the trend in standard loss ratios that suggests too much/little credibility in the proposed and current plans respectively.
- Grouping by manufacturing type. Syllabus readings recommend separating tests by premium size but otherwise never mention separating within a single class. The question specifically stated that all risks were part of a single manufacturing class, therefore, candidates lost some credit for separating the 10 risks by manufacturing type in efficiency and quintiles tests.

Part b

Candidates were expected to evaluate the appropriateness of these ten risks being grouped together in a single class.

Full credit answers recognized the class is not homogenous and demonstrated this by calculating the manual loss ratios, average loss, or experience mods for Robots and Made by hand manufacturing types.

Candidates also received credit for addressing credibility concerns with further refining the class.

Candidates who included a response in Part b that pertained to Part a, such as discussing the trend in proposed standard loss ratios and the implication of too much credibility, were given the appropriate credit in Part a.

Common mistakes include:

- Not discussing class fit.
- Not recognizing that the risks are currently part of the same class.
- Not fully justifying the decision to separate Robots and Made by hand into two classes.