Reading: Werner 09: Risk Classification W-09 (022) - (2017.Spring #7 Problem)
Model: Univariabe Methods for Rating Variable Differentials
Problem Type: Pure Premium Method - With Credibility & Off-Balance

Find Calculate the indicated rate change for each class that results in a revenue-neutral overall change.

Given

level of variable	EE	reported L + ALAE	current relativity
1	10,500	512,000	1.000
2	5,200	740,000	1.500
3	13,100	632,000	1.300

* EE = Earned Exposures

Full credibility: 13,260 exposures
Use the square-root rule for credibility.
Complement of credibility is no change.

Step 1 complete the following table and note the key columns:

(Col 5) = indicated relativity

(Col 8) = current relativity (**normalized** so that the exposure-weighted average equals 1.000)

(Col 9) = weighted average of (Col 5) and (Col 8) using (Col 6) as the weight for (Col 5)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
level of variable	EE	reported L + ALAE	pure premium	indicated relativity	credibility (weights)	current relativity	**normalized** current relativity	cred-wtd indicated relativity
A	10,500	512,000	49	0.745	0.890	1.00	0.815	0.753
B	5,200	740,000	142	2.175	0.626	1.50	1.223	1.819
C	13,100	632,000	48	0.737	0.994	1.30	1.060	0.739
Total	28,800	1,884,000	65.417	1.000	--	**1.227**	1.000	**0.939**

(4) = (3) / (2)

(5) = (4) / (Tot4)

(6) = sqrt[(2) / 13260] *(maximum value is 1.0)*

(7) given information

(Tot7) = exposure-weighted average of (7)

(8) = (7) / (Tot7)

(9) = [(6) x (5) + (1.0 - (6)) x (8)] **(Tot 9)** = exposure-weighted average of (9)

Step 2 calculate the % change in relativity <u>from</u> current <u>to</u> credibility-weighted indicated, but note:

==> you must first normalize the cred-wtd indicated relativity as shown in (Col 10)

==> you must then "**off-balance**" the change in (Col 11) so that the **total change is 0.0%** in (Col 12)

(1)	(10)	(11)	(12)
level of variable	**normalized** cred-wtd ind. rel.	change	**change with off-bal.**
A	0.802	-19.8%	-1.7%
B	1.937	29.1%	58.4%
C	0.787	-39.5%	-25.7%
Total	1.000	-18.5%	0.0%

(final answers in green)

(12) = (10)/(8)-1 **<==** alternate formula for (12)

change with off-bal.
-1.7%
58.4%
-25.7%
0.0%

* *This way of calculating column (12) seems simpler than the method given in the examiner's report.*

(10) = (9) / (Tot9)

(11) = (10) / (7) - 1.0

(12) = (1.0 + (11)) / (1.0 + (Tot11)) - 1.0