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	173	117,640	1.220
2	429	296,010	1.000
3	163	61,940	0.620

* EE = Earned Exposures

Full credibility: 12,320 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	192	111,360	580	1.142	0.141	1.53	1.874	1.771
B	399	199,500	500	0.985	0.203	0.40	0.490	0.590
C	159	69,960	440	0.867	0.128	1.00	1.225	1.179
Total	750	380,820	507.760	1.000	--	**0.816**	1.000	**1.017**

(4) = (3) / (2)

(5) = (4) / (Tot4)

(6) = sqrt[(2) / 9660] *(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)	(12) = (10)/(8)-1 **<==** alternate formula for (12)
level of variable	**normalized** cred-wtd ind. rel.	change	**change with off-bal.**	**change with off-bal.**
A	1.741	13.8%	-7.1%	-7.1%
B	0.580	45.1%	18.5%	18.5%
C	1.159	15.9%	-5.4%	-5.4%
Total	1.000	22.5%	0.0%	0.0%

(final answers in green)

** 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