MS Module 23 Balance principle multiplicative model practice exam questions

(The attached PDF file has better formatting.)

[The practice problems in the 24 modules explain the statistical procedures; the practice exam questions in this thread shows what you will be asked on the final exam.]

The mean values and the number of observations in each cell of a 2 × 2 classification table are

Means	*Column 1*	*Column 2*	*Observations*	*Column 1*	*Column 2*
Row 1	87	45	*Row 1*	14	16
Row 2	31	15	*Row 2*	19	15

Illustration: The cell in row 1 column 1 has a mean of 87 from a sample of 14 observations.

An actuary is setting class relativities for insurance pricing using a multiplicative model balance principle, with

- a base rate of 10
- a starting relativity for column 1 of 2.1
- a starting relativity for column 2 of 1

Question 23.1: Balance principle multiplicative model implied relativity row 1

What is the implied relativity for Row 1, given the starting relativities by column?

Answer 23.1: (87 × 14 + 45 × 16) / (10 × (2.1 × 14 + 1.0 × 16)) = 4.269

(implied relativity for row 1 = observed value for row 1 / expected value for row 1 with no relativity)

Question 23.2: Balance principle multiplicative model implied relativity row 2

What is the implied relativity for Row 2, given the starting relativities by column?

Answer 23.2: (31 × 19 + 15 × 15) / (10 × (2.1 × 19 + 1.0 × 15)) = 1.483

(implied relativity for row 2 = observed value for row 2 / expected value for row 2 with no relativity)

Question 23.3: Balance principle multiplicative model implied relativity column 1

What is the implied relativity for Column 1, given the computed relativities by row?

Answer 23.3: (87 × 14 + 31 × 19) / (10 × (4.269 × 14 + 1.483 × 19)) = 2.055

(implied relativity for column 1 = observed value for column 1 / expected value for column 1 with no relativity)

Question 23.4: Balance principle multiplicative model implied relativity column 2

What is the implied relativity for Column 2, given the computed relativities by row?

Answer 23.4: (45 × 16 + 15 × 15) / (10 × (4.269 × 16 + 1.483 × 15)) = 1.044

(implied relativity for column 2 = observed value for column 2 / expected value for column 2 with no relativity)