Errata and Updates for ASM Exam MAS-II (Third Edition) Sorted by Date

[3/14/2023] On page 99, in exercise 10.3, on the second line, an x is missing in the exponent. The formula should read

$$f(x \mid \lambda) = \lambda e^{-\lambda x} \qquad x > 0$$

Two lines after the formula, change 0.000001 to 0.0000001.

[3/13/2023] On page 99, in exercise 10.4, on the second line, an x is missing in the exponent. The formula should read

$$f(x \mid \lambda) = \lambda e^{-\lambda x} \qquad x > 0$$

[3/13/2023] On page 172, two lines above equation (16.2), in the fraction, put a bar above X_i so that it reads

$$\frac{\sum_{j=1}^{n}(X_{ij} - \bar{X}_i)^2}{n-1}$$

[3/13/2023] On page 362, delete the footnote.

[3/13/2023] On page 423, 3 lines from the bottom of the page, change "$\lambda_i = \log\_exposures\ldots$" to "$\ln \lambda_i = \log\_exposures\ldots$"

[3/13/2023] On pages 487–514, replace every "cross-entropy" with "entropy".

[3/13/2023] On page 478, on the line above the first displayed expression, change "mean square error" to RSS. One line and three lines below the displayed expression, change MSE to RSS.

[3/13/2023] On page 489, delete footnote 1.

[3/13/2023] On page 510, replace the solution to exercise 39.5 with the following:

Splits I and III don't split at all; all observations go into R_2. Split II puts (4,1) into R_2 and everything else into R_1. There is no error for (4,1), whereas the error of the other 5 is the square difference from the mean, or the population (division by 5) variance times 5, which is 0.548. Split IV puts (1,0) into R_1 and everything else into R_2. Once again, we can compute the RSS as the variance in R_2, or 0.2824, times 5, or 1.412. Split V puts two observations, (3,2) and (2,2), into R_2 and the others into R_1. The variance of the observations in R_1 is 0.451875 so the sum of squares is $4(0.451875) = 1.8075$. The RSS for R_2 is $(1.5-1.75)^2+(2-1.75)^2 = 0.125$. The total RSS for this split is $1.8075+0.125 = 1.9325$. Split II minimizes the RSS. **(B)**

[3/13/2023] On page 516, in the table, change x_{62} from 1 to -1.

[2/14/2023] On page 275, on the second line from the end of the page, change $\hat{\beta}_1 = 0.78125$ to $\hat{\beta}_1 = 0.5$. Also put a hat on the β_1 at the end of the line.

[11/3/2022] On page 416, replace the solution to exercise 34.9 with

The first sum of two consecutive ρs that is negative is $0.015-0.02$, so $t = \boxed{\mathbf{35}}$.

[11/1/2022] On page 198, in the paragraph beginning with "1.", on the last line, change "would it" to "would fit".

[11/1/2022] On page 229, the last line of the solution to exercise 19.6, "Later on in the course …", belongs after the solution to exercise 19.5, and is not correct for exercise 19.6.

[11/1/2022] On page 328, on the first displayed line, change the second $10\sqrt{2\pi}$ denominator to $\sqrt{2\pi}$ (delete the 10) and change the second 200 denominator to 2, so that the displayed line reads

$$\frac{1}{10\sqrt{2\pi}} \exp\left(-\frac{(\beta_0-50)^2}{200}\right) \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{(\beta_1-5)^2}{2}\right)\left(\frac{1}{20}\right)$$

[11/1/2022] On page 771, in the solution to question 4, on the second to last line, change $\frac{0.1(\mu_s^2+\sigma_s^2)}{0.2\mu_s^2}$ to $\frac{0.1(\mu_X^2+\sigma_X^2)}{0.2\mu_X^2}$.

[11/1/2022] On page 806, in the solution to question 21, change the numbering to I, II, III, and change III to

The WAIC calculation changes when data is aggregated since the aggregated likelihoods are multiplied by binomial coefficients. $\times$

Change the answer key to **(E)**.

[9/8/2022] On page 480, in exercise 38.10, in the three bullets, the models should be numbered as Model I, Model II, and Model III respectively.

[8/17/2022] On page 266, in exercise 24.2, on the first line, change "variable" to "variables".

[8/17/2022] On page 270, in the solution to exercise 24.1, on the line under "Level 1", delete the duplicate "$u_{3k} \times \text{VAR3}_k$".

[8/17/2022] On page 271, replace the solution to exercise 24.2 with

Level 1

$$\text{ACCIDENTS}_{ij} = b_0 + b_1 \times \text{SEX}_{ij} + b_2 \times \text{TICKETS}_{ij} + b_3 \times \text{ACC}_{ij} + \varepsilon_{ij}$$

Level 2

$$\begin{aligned} b_0 &= \beta_0 + \beta_4 \times \text{REGISTRATIONS}_j + \beta_5 \times \text{ROADMILES}_j + u_{0j} \\ b_1 &= \beta_1 + u_{1j} \\ b_2 &= \beta_2 + u_{2j} \\ b_3 &= \beta_3 + u_{3j} \end{aligned}$$

[5/10/2022] On page 593, in question 33, change the WAIC for model2 from 106.1 to 108.1.

[5/10/2022] On page 789, vhange the answer key for question 18 from (A) to (B).

[5/8/2022] On pages 180–181, Example 16E is not solved correctly, since $\bar{x} = 1420$. If it is solved correctly, the VHM is negative, resulting in no credibility.

Here ia a revised example:

EXAMPLE 16E You have the following experience for two group policyholders for one year:

Group	Number of members	Mean loss	Standard deviation of loss
A	68	1500	1800
B	32	1000	2200

Using nonparametric empirical Bayes estimation, calculate anticipated losses per member for each group.

SOLUTION: The overall mean is

$$\bar{x} = \frac{68(1500)+32(1000)}{100} = 1340$$

The expected process variance is obtained by pooling the variances of the two groups. We use the numbers of members to do this.

$$\widehat{v} = \frac{1800^2(67)+2200^2(31)}{98} = 3{,}746{,}122$$

The denominator of the VHM is

$$100-\frac{68^2+32^2}{100}=43.52$$

The variance of hypothetical means is

$$\widehat{a}=\frac{68(1500-1340)^2+32(1000-1340)^2-3{,}746{,}122}{43.52}=38{,}921.82$$

The credibility factor is

$$\hat{k}=\frac{3{,}746{,}122}{38{,}921.82}=96.247$$
$$\hat{Z}_A=\frac{68}{68+96.247}=0.414010$$
$$\hat{Z}_B=\frac{32}{32+96.247}=0.249518$$

The mean that balances the estimators is

$$\hat{\mu}_X=\frac{0.414010(1500)+0.249518(1000)}{0.414010+0.249518}=1311.98$$

The credibility estimates are

$$P_A=0.414010(1500)+0.585990(1311.98)=\boxed{\textbf{1389.82}}$$
$$P_B=0.249518(1000)+0.750482(1311.98)=\boxed{\textbf{1234.13}}$$ □

[5/8/2022] On page 776, in the solution to question!33 statement I, change 96.7 to 96.2.

[3/31/2022] On page 192, replace the solution to exercise 16.15 with

$$m=357+222+181=760$$
$$\bar{x}=\frac{357(890)+222(589)+181(431)}{760}=692.76$$
$$\widehat{v}=\frac{356(1000^2)+221(400^2)+180(400^2)}{760-3}=555{,}033$$
$$\widehat{a}=\frac{357(890-692.76)^2+222(589-692.76)^2+181(431-692.76)^2-2(555{,}033)}{760-(357^2+222^2+181^2)/760}=56{,}922.51$$
$$k=\frac{555{,}033}{56{,}922.51}=9.7507$$

The credibility factors are

$$Z_1=\frac{357}{357+9.7507}=0.9734$$
$$Z_2=\frac{222}{222+9.7507}=0.9579$$
$$Z_3=\frac{181}{181+9.7507}=0.9489$$

The credibility-weighted mean, and the prediction, are

$$\bar{x}^{\text{CRED}}=\frac{0.9734(890)+0.9579(589)+0.9489(431)}{0.9734+0.9579+0.9489}=638.67$$
$$P_C=(0.9734)(890)+(1-0.9734)(638.67)=\boxed{\textbf{883.3}}$$

[3/29/2022] On page 310, one under the first table, change "grid-approximated prior" to "grid-approximated posterior".

[3/22/2022] On page 438, one line above Section 36.4, change "highest WAIC" to "lowest WAIC".

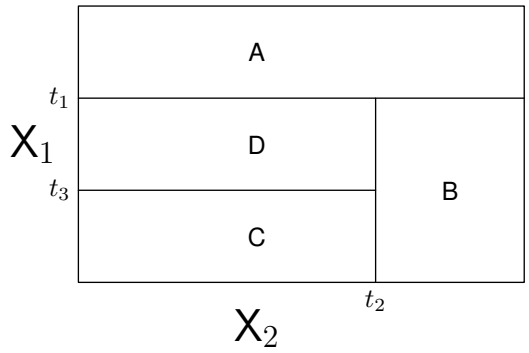
[3/22/2022] On page 446, in the solution to exercise 36.3, on the seventh line, change 0.177759 to 0.717759..

[3/6/2022] On page 302, replace the solution to exercise 26.6 with

Mean Group #3 splits the treatments into four categories: {2}, {1,3}, {4,6}, {5,7,8}. This is 2 more categories than Mean Group #1, for which R indicates 1469 degrees of freedom. Thus a model using Mean Group #3 would have **1467** degrees of freedom for each fixed effect. Notice that the full model, with all 8 treatments, has 1463 degrees of freedom, four less than mean group #3 which has four fewer groups than the full model, and two more than mean group #1 which has two fewer groups than mean group #3.

[2/17/2022] On page 129, in exercise'11.13, on the line below the table, change "given than" to "given that".

[10/3/2021] On page 498, in the graph of answer choice (B), t_1 and t_3 should be interchanged, so that the graph looks like this:



[9/26/2021] On page 763, replace the solution to question 1 with:

Model 4 is nested within Model 3 which is nested in Model 2 which is nested in Model 1. Model 2 is also nested within Model 5.

Model 2 deletes one random effect from Model 1, so REML is needed for both of them. Model 3 deletes a fixed effect from Model 2, so ML is needed for both. Model 4 deletes a random effect from Model 3, so REML is needed for both of them. We see that the REML runs of Model 1, Model 2, and Model 3 are all used. REML and Model 2 REML are used, but Model 3 REML is not used. **(E)**

[9/9/2021] On page 485, in the solution to exercise 38.10, on the last line, change "one N" to "two Ns".

[9/9/2021] On page 486, in the solution to exercise 38.15, the signs of the ε_i in the table should be reversed; they should also be reversed in the two fractions two and five lines below the table. Thus the table and the following lines should read:

X_i in training set	Nearest two points	Fitted value	Y_i	ε_i
4	4,12	$\frac{3+15}{2}=9$	3	−6
7	4,12	$\frac{3+15}{2}=9$	8	−1
12	12,14	$\frac{15+22}{2}=18.5$	15	−3.5
14	14,15	$\frac{22+30}{2}=26$	22	−4
15	14,15	$\frac{22+30}{2}=26$	30	4
21	15,22	$\frac{30+53}{2}=41.5$	40	−1.5
22	15,22	$\frac{30+53}{2}=41.5$	53	11.5

The MSE on the training data is

$$\frac{(-6)^2+(-3.5)^2+(-4)^2+4^2+11.5^2}{5}=\boxed{\mathbf{42.5}}$$

We divide by 5 since no parameters are estimated.

The MSE on the test data is

$$\frac{(-1)^2+(-1.5)^2}{2}=\boxed{\mathbf{1.625}}$$

[9/9/2021] On page 494, in formula (39.5), a 2 is missing from the numerator. The formula is

$$\text{Residual mean deviance}=-\frac{2\sum_m\sum_k n_{mk}\ln\hat{p}_{mk}}{n-|T|}$$

[9/9/2021] On page 543, in the sidebar, 2–3 lines below the displayed equation, switch i and i^*: "once for each i (for the first summand) or for each i^* (for the second summand)".

[9/9/2021] On page 555, in exercise 41.21, replace the last line with the answer choices:

(A) I only (B) II only (C) III only (D) I, II, and III
(E) The correct answer is not given by (A) , (B) , (C) , or (D) .

[8/24/2021] On page 526, exercise 40.5, while the exercise can be worked out, the second and third bullets are false. The first principal component loading for X_1 is $1/\sqrt{2}$, and the first principal component loading for X_2 is negative.

[8/22/2021] On page 129, in exercise 12.15, in the fourth through sixth bullets, change "Risk group R" to "Risk group T".

[8/22/2021] On page 129, in exercise 12.16, on the tenth line, change "Group SR" to "Group S'.

[8/3/2021] On page 386, in equation (33.1), change θ_{prop} to $p(\theta_{\text{prop}}$ and θ_{curr} to $p(\theta_{\text{curr}}$, where p is the prior density function.

[8/3/2021] On page 388, in equation (33.1), the right parenthesis after "Data" in the denominator should be moved to after θ_{curr}, also in the denominator.

[7/23/2021] On page 161, in the solution to exercise 14.14, replace the first two lines with:

Expected claims are $0.2(1800)=360$. The limited fluctuation estimate is based on a credibility factor of $Z=\sqrt{360/1083}=0.5766$, and is

$$0.5766\left(\frac{200}{1800}\right)+(1-0.5766)(0.2)=0.1488$$

Replace the last line with:

The percentage change is $0.1724/0.1488-1=$ **+15.91%**. **(E)**

[3/29/2021] On page 511, in the solution to exercise 39.9, on the fifth line, change "$86+82+81+4(9)=286$ to $82+81+11+86+4(9)=296$.