# Errata and Updates for ASM Exam MAS-II (Second Edition) Sorted by Page

Practice Exam 4:22, page 617, is defective. Replace the question with the one below.

[2/28/2021] On page 4, in the solution to Example 1A, change 500 to 5000 in the five places that it appears. In other words, on the first line change $(500-a, 500+a)$ to $(5000-a, 5000+a)$; change $(500+a,\infty)$ to $(5000+a,\infty)$. On the second line change $(-\infty, 500-a)$ to $(-\infty, 5000-a)$ and change $500+a$ to $5000+a$.

[4/30/2012] On page 31, change the solution to exercise 3.9 to

$$\lambda_F = \left(\frac{\Phi^{-1}(0.99)}{0.05}\right)^2 = \left(\frac{2.326}{0.05}\right)^2 = 2164.11$$

For severity, the credibility standard is expressed in terms of number of exposures, which is number of claims. We had 1384 claims.

$$e_X = 2164.11\left(\frac{6{,}010}{55^2}\right) = 4{,}300$$
$$Z_X = \sqrt{\frac{1{,}384}{4{,}300}} = 0.567354$$

For pure premium, the credibility standard is expressed in terms of number of exposures, which is number of policies. We have 21,000 policies. We divide the usual formula for the credibility standard in terms of number of expected claims by 0.085 to express it in terms of number of policies

$$e_P = \frac{2164.11}{0.085}\left(1+\frac{6{,}010}{55^2}\right) = 76{,}044$$
$$Z_P = \sqrt{\frac{21{,}000}{76{,}044}} = 0.525506$$

The absolute difference between credibility factors is **0.0418**. **(A)**

[4/30/2021] On page 38, in exercise 4.5, on the first line in typewriter font (the seventh line of the question), change `lambda` to `lambdas`.

[5/19/2021] On page 76, in the solution to exercise 7.9, on the first three displayed lines, change every $x$ to $q$: $f(x)$ should be $f(q)$ and $\mathrm{d}x$ should be $\mathrm{d}q$. Four changes.

[2/17/2022] On page 109, in exercise‘11.13, on the line below the table, change “given than” to “given that”.

[5/19/2021] On page 118, one line above the heading “The exposure unit”, insert “are” between “you” and “calculating”.

[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 127, in exercise 12.16, on the tenth line, change “Group SR” to “Group S’.

[7/23/2021] On page 159, 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 $0.1724/0.1488-1=\boxed{\textbf{+15.91\%}}$. **(E)**

[3/15/2021] On page 174, two lines from the bottom, a sum sign is missing from the numerator. The line should be

$$=\frac{\sum_{j=1}^{n} m_j^2(\beta+\alpha/m_j)}{m^2}$$

[3/15/2021] On page 175, two lines from the bottom of the sidebar, change $v(n-1)$ to $v(r-1)$.

[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.

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

The denominator of the VHM is

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

The variance of hypothetical means is

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

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

$$P_A=0.414010(1500)+0.585990(1311.98)=\boxed{\mathbf{1389.82}}$$

$$P_B=0.249518(1000)+0.750482(1311.98)=\boxed{\mathbf{1234.13}}$$

□

[3/15/2021] On page 187, in the solution to exercise 16.6, on the line for $\sigma^2_{\text{HM}}$, change $\dfrac{2163}{3}$ to $\dfrac{2163}{8}$.

[3/31/2022] On page 190, replace the solution to exercise 16.15 with

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

The credibility factors are

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

The credibility-weighted mean, and the prediction, are

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

[4/8/2021] On page 273, in the solution to Example 25A, on the first line, change $\hat{\beta}_0=\frac{5}{7}$. to $\hat{\beta}_1=\frac{5}{7}$.

[3/23/2021] On page 300, in the last paragraph, lines 3–4, change the two sentences beginning with “Covariance” to

Covariance of two observations of the same student with different teachers is $a$. Covariance of two observations of the same teacher with different students is $b$.

[3/22/2021] On page 300, on the third line from the end of the page, change $b+c$ to $a+b$.

[3/29/2022] On page 304, one under the first table, change “grid-approximated prior” to “grid-approximated posterior”.

[4/22/2021] On page 305, on the third line of the page, change 15 to 5.

[4/7/2021] On page 316, in the solution to exercise 28.12, replace the last three lines with

$$\begin{aligned}
\frac{100}{9}a^2 &= 0.1\\
a &= \boxed{\mathbf{0.09487}}\\
b &= 1-\frac{7}{3}a=\boxed{\mathbf{0.77864}}
\end{aligned}$$

[3/22/2021] On page 346, one line under X → Y → Z, change B to Y.

[8/3/2021] On page 380, in equation (33.1), change $\theta_{\text{prop}}$ to $p(\theta_{\text{prop}}$ and $\theta_{\text{curr}}$ to $p(\theta_{\text{curr}}$, where $p$ is the prior density function.

[8/3/2021] On page 382, in equation (33.1), the right parenthesis after "Data" in the denominator should be moved to after $\theta_{\text{curr}}$, also in the denominator.

[2/13/2021] On page 410, in the solution to exercise 34.9, change the final answer from 35 to 36.

[3/22/2022] On page 432, one line above Section 36.4, change "highest WAIC" to "lowest WAIC".

[3/22/2022] On page 440, in the solution to exercise 36.3, on the seventh line, change 0.177759 to 0.717759..

[4/16/2021] On page 451, one line above the last paragraph on the page, change $K(K-1)$ to $K(K-1)/2$.

[9/9/2021] On page 479, in the solution to exercise 38.10, on the first line, change "so in Model I $Y = P$" to "so in Model I $Y = U$. On the last line, change "one N" to "two Ns".

[9/9/2021] On page 480, in the solution to exercise 38.15, the signs of the $\varepsilon_i$ 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 | $Y_i$ | $\varepsilon_i$ |
|---|---|---|---|---|
| 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 488, in formula (39.5), a 2 is missing from the numerator. The formula is

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

[3/29/2021] On page 504, in the solution to exercise 39.9, on the fifth line, change "$86+82+81+4(9)=286$ to $82+81+11+86+4(9)=296$.

[8/24/2021] On page 517, exercise 40.6, 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.

[4/27/2021] On page 527, in the solution to exercise 40.12, replace II with

When a variable is scaled, it is divided by its standard deviation to make the variance 1. Since the first principal component has maximal variance, it will put lower loading on variables with lower variance. The higher the variance of the original variable, the greater the reduction in loading.

Comparing the unscaled and scaled biplots, we see that X3's loading on the first principal component was significantly decreased whereas the loadings of the other variables on the first principal component were increased. We conclude that X3 has the highest variance. ✓

[4/27/2021] On page 528, replace the solution to exercise 40.20 with

I. I can be deduced.✓

II. It is not clear whether Sue sold a lot of dental insurance or had a high first principal component score because she sold a lot of life or health insurance.✗

III. Bob may have sold a lot of life insurance but very little health and dental.✗**(E)**

[9/9/2021] On page 533, 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)".

[5/10/2022] On page 583, in question 33, change the WAIC for model2 from 106.1 to 108.1.

[4/27/2021] On page 599, in question 24, change the fourth line to $\text{logit}(p_i) = \alpha + \beta T_i$.

[4/11/2021] On page 591, replace question 22 with

$X$ has a Bernoulli distribution with $q = 0.4$.

Calculate the information entropy of 20 observations of $X$.

[5/8/2022] On page 738, in the solution to question!33 statement I, change 96.7 to 96.2.

[4/8/2021] On page 740, in the solution to question 39, change the answer key to **(B)**. Make the same change in the answer key on page 733.

[4/11/2021] On page 749, in the solution to question 3, on the third line, change $sigma^2_{HM}$ to $\sigma^2_{HM}$.

[5/10/2022] On page 752, vhange the answer key for question 18 from (A) to (B).

[4/18/2021] On page 764, replace the solution to question 40 with

We multiply the first row of the loading matrix, the loadings of the first variable on the three principal components, by the scores of the three principal components.

$$x_{11} \approx 1.220(0.732) + 0.002(0.437) - 1.279(-0.523) = \boxed{\mathbf{1.563}} \qquad \textbf{(E)}$$