Errata and updates for ASM Exam SRM Study Manual (Second Edition) sorted by date

Practice exam 6:4 is defective in that none of the answer choices are correct.

Practice exam 5:9 should be corrected as listed below (page 391).

[10/11/2021] On page 337, 3 lines above Section 21.2, change $\hat{y}_{T+1} = \hat{y}_T$ to $\hat{y}_{T+1} = \hat{s}_T$.

[10/3/2021] On page 208, in the first full paragraph, on the second line, change "to make e^{α_i} a gamma distribution" to "to make α_i a gamma distribution". In fact, e^{α_i} follows a loggamma distribution.

[9/26/2021] On page 141, the wording for prediction and confidence intervals is confusing. Make the following changes:

- Change the paragraph containing equations (9.2) and (9.3) to

  The variance of the realized value of y is the variance of y^* plus the variance of the error term, which is estimated by s^2. Accordingly, a $1-\alpha$ confidence interval for the predicted value y^* is

  $$\hat{y}^* \pm t_{1-\alpha/2} s \sqrt{\frac{1}{n} + \frac{(x^* - \bar{x})^2}{\sum (x_i - \bar{x})^2}} \tag{1}$$

  and a $1-\alpha$ prediction interval for the realized value of y is

  $$\hat{y}^* \pm t_{1-\alpha/2} s \sqrt{1 + \frac{1}{n} + \frac{(x^* - \bar{x})^2}{\sum (x_i - \bar{x})^2}} \tag{2}$$

  There are $n-2$ degrees of freedom.

- On the first line of the next paragraph, change "prediction" to "realized value".

[9/9/2021] On page 21, in exercise 2.21, on the eighth line, change "volumne" to "volume".

[9/9/2021] On page 30, in the solution to exercise 2.26, on the first line, delete the first "for males".

[9/9/2021] On page 52, in the solution to exercise 3.29, on the second line, change $\bar{x}$ to $\mathbf{x}$.

[9/9/2021] On page 81, delete exercise 5.13, which is a duplicate of exercise 5.7.

[9/9/2021] On page 89, in the solution to exercise 5.145, 4 lines from the end, change "multiplying this by 1.642599" to "multiplying this by 0.622721".

[9/9/2021] On page 100, in the solution to exercise 6.7, on the first line, change "thin" to "thing".

[9/9/2021] On page 110, in step 5 of "Forward subset selection", on the second line, change $d = 0$ to $p = 0$.

[9/9/2021] On page 138, in the solution to exercise 8.12, change the final answer to $\boxed{\mathbf{10.43478}}$.

[9/9/2021] On page 153, three lines above Table 11.2, change $b(\theta) = \theta$ to $b(\theta) = e^{\theta}$.

[9/9/2021] On page 157, in Table 11.3, on line 3, change "famly" to "family".

[9/9/2021] On page 166, in exercise 11.20, in the table, on the row for Zone 4, degrees of freedom (df) should be 0.

[9/9/2021] On page 227, in exercise 14.9, on the first line, change "varialbes" to "variables". On the second line, change mu_i to μ_i.

[9/9/2021] On page 227, in exercise 14.10, on the first line, change $x_1, cdots, x_5$ to $x_1, \cdots, x_5$.

[9/9/2021] On page 253, in the solution to exercise 15.10, 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 254, in the solution to exercise 15.15, 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 261, in formula (16.5), 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 297, 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 329, 4 lines from the bottom of the page, the error should be $y_i - \hat{y}_i$, reversing the signs of the errors. Thus the last 4 lines on the page should read

$$\varepsilon_t = y_t - \hat{y}_t = y_t - (78.75 - 0.75y_{t-1})$$

We cannot calculate $\hat{y}_1$, so we can't calculate the first error. The other errors are −2.5, −0.5, 0.25, −2.75, and −2.25. The mean error is −1.55. The variance of the error is

$$\frac{1}{6-3}\left(\big(-2.5-(-1.55)\big)^2 + \big(-0.5-(-1.55)\big)^2 + \big(0.25-(-1.55)\big)^2 + \big(-2.75-(-1.55)\big)^2 + \big(-2.25-(-1.55)\big)^2\right)$$
$$= \boxed{\mathbf{2.391667}}$$

[9/9/2021] On page 350, in question 4, the answer choices should be values, not ranges. Replace the answer choices with

(A) 80 (B) 160 (C) 320 (D) 640 (E) 1280

[8/31/2021] On page 77, at the end of the fourth paragraph of Section 5.3, change "low" to "high".

[8/25/2021] On page 328, change the second line of the solution to exercise 19.22 to

$$\frac{100}{4}\left(\frac{-1}{2}+\frac{-2}{1}+\frac{3}{6}+\frac{1}{4}\right)=\boxed{\mathbf{-43.75}}$$

[8/24/2021] On page 285, exercise 17.6, 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.

[8/10/2021] On page 118, in the solution to exercise 7.27, on the last line, change $\left(\frac{n-1}{n-p}\right)$ to $\left(\frac{n-1}{n-p-1}\right)$.

[8/10/2021] On page 119, in the solution to exercise 7.29, on the second line, change $\left(\frac{n-1}{n-p}\right)$ to $\left(\frac{n-1}{n-p-1}\right)$.

[4/27/2021] On page 292, in the solution to exercise 17.12, 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. ✓

[1/16/2021] On page 415, in the solution to question 33, change II and III to:

II All we know is that when the clusters were {1}, {2}, {3}, {4}, and {5,6,7}, {4} was fused with {5,6,7}. So {4} is closer to the centroid of {5,6,7} than {3} is, and {4} is closer to the centroid of {5,6,7} then it is to {3}. None of these imply II. ✗

III All we know is that {3} is closer to the centroid of {4,5,6,7} than {1} is to {2}, since it was fused first. That doesn't imply III. ✗

[12/26/2020] On page 283, in exercise 17.1 statement I, on the left side, change ϕ_{ji} to ϕ_{j1}.

[12/26/2020] On page 438, in the solution to question 4, change the last line to

$$-2\left(\frac{\begin{array}{r}45\ln\frac{45}{55}+10\ln\frac{10}{55}+32\ln 0.8+8\ln 0.2+10\ln 0.25+30\ln 0.75\\ +5\ln 0.1+45\ln 0.9+3\ln\frac{3}{55}+52\ln\frac{52}{55}\end{array}}{240-5}\right)=\boxed{\mathbf{-0.8211}}$$

None of the five answer choices is correct.

[12/20/2020] On page 292, in the solution to exercise 17.11, replace the second paragraph with

Abigael has a negative score from the first component. But we cannot tell whether that is because she purchases more food than the average customer or because she purchases less clothes, linen, ana appliances than the average customer. We cannot conclude II.

[12/20/2020] On page 318, on the fourth line of Section 19.6, change "(excess of forecast over actual) $e_t = \hat{y}_t - y_t$" to "(excess of actual over forecast) $e_t = y_t - \hat{y}_t$".

[12/20/2020] On page 323, in exercise 19.12 III, change "parameter 0" to "parameter $\mu_C = 0$".

[12/20/2020] On page 339, on the ninth line under "Seasonal exponential smoothing", change $\sum_{j=1}^{SB} S_t$ to $\sum_{t=1}^{SB} S_t$.

[12/20/2020] On page 343, in exercise 21.11, change the n subscripts in y_n, $b_{0,n-1}$, and $b_{1,n-1}$ to T.

[12/20/2020] On page 343, in exercise 21.15(ii), change Var(w) to w.

[12/20/2020] On page 345, in the solution to exercise 21.11, change the n subscripts in $b_{0,n}$ and $b_{1,n}$ to T.

[12/20/2020] On page 346, in the solution to exercise 21.15, change Var(w) to w.

[12/20/2020] On page 391, in question 9, on the third line, change ϕ_{ij} to ϕ_{ji}.

[12/20/2020] On page 402, in question 15, on the first line, put parentheses around 75,41: {(75,41)}. On the last line before the answer choices, put parentheses around 60,22: {(60,22)}.

[12/20/2020] On page 428, replace the solution to question 12 with

I can be deduced. Bob may have sold a lot of life insurance but very little health and dental. 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. **(E)**

[12/19/2020] On page 197, in exercise 12.39, on the second line, change x_j to x_i.

[12/19/2020] On page 272, in the solution to exercise 16.4, replace the last 5 lines of the solution with

Pruning S leaves 4 terminal nodes, for a cost of 251 + 11 + 20 + 58 + 4(9) = 376.

Pruning T leaves 3 terminal nodes, for a cost of 209 + 82 + 81 + 3(9) = 399

Pruning X leaves 4 terminal nodes for a cost of 86 + 82 + 81 + 4(9) = 286

Pruning both S and X leaves 3 terminal nodes for a cost of 251 + 11 + 86 + 3(9) = 375.

(D)

[12/19/2020] On page 289, in exercise 17.14, on the seventh line, change $\sum_{i=1}^{500} x_i^2 = 750$ to $\sum_{i=1}^{500} z_i^2 = 750$.

[12/18/2020] On page 107, in exercise 7.5, on the first line, change "lke" to "like".

[12/18/2020] On page 108, in exercise 7.9, in the table, for Model 4, change X_4 to X_5.

[12/18/2020] On page 111, in exercise 7.18, in the table, remove the horizontal line between Model 17 and Model 18.

[12/18/2020] On page 112, in exercise 7.20, in the table, remove the horizontal line between Model 17 and Model 18.

[12/18/2020] On page 139, in the solution to exercise 8.20, replace the final answer $\boxed{\boldsymbol{(\hat{\beta}_1, \hat{\beta}_2) = (0, 3)}}$ with $\boxed{\boldsymbol{(\hat{\beta}_1, \hat{\beta}_2) = (3, 0)}}$

[12/18/2020] On page 151, two lines below the numbered list, delete the extra period after "model".

[12/17/2020] On page 9, on the first line, add "Reading: " to the beginning of the line, before *Regression Modeling with Actuarial and Financial Applications*.

[12/17/2020] On page 12, on the sixth line of Section 2.2, change the column vector for $\mathbf{y}$ to $\begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}$.

[12/17/2020] On page 23, in exercise 2.24, on the fourth line, put a semicolon before $\mathbf{X'X}^{-1}$ and put parentheses around $\mathbf{X'X}$ in that expression so that the expression is $(\mathbf{X'X})^{-1}$.

[12/17/2020] On page 24, in exercise 2.25, on the fifth line, put parentheses around the first $\mathbf{X'X}$ so that the expression is $(\mathbf{X'X})^{-1}$.

[12/17/2020] On page 70, in the solution to exercise 4.27, on the last line, change $F_{2,814}$ to $F_{3,814}$.

[12/17/2020] On page 81, in exercise 5.12, on the first line, change $\beta \cdot x_i$ to $\beta_1 x_i$.

[12/17/2020] On page 82, in exercise 5.14, on the fourth line, put a semicolon before $\mathbf{X'X}^{-1}$ and put parentheses around $\mathbf{X'X}$ in that expression so that the expression is $(\mathbf{X'X})^{-1}$.

[12/17/2020] On page 90, in the solution to exercise 5.20, on the third line, add "is" after "VIF".

[12/17/2020] On page 91, on the second line of the solution to Quiz 5-3, add a right parenthesis in the first denominator after $(21 - 2 - 1$.

[12/17/2020] On page 99, in exercise 6.11, in answer choices (D) and (E), change 1.4 to 2.4.

[11/13/2020] On page 381, in question 9, assume that the means of the 4 variables are 0.

[11/6/2020] On page 270, in exercise 16.17, on the second line, change $\lambda = 2$ to $\lambda = 0.2$.

[11/4/2020] On page 11, on the last line of the solution to Example 2B, change "$\bar{y} - \hat{\beta}_0 \bar{x}$" to "$\bar{y} - \hat{\beta}_1 \bar{x}$".

[11/4/2020] On page 12, on the third line of Section 2.2, change "We than have" to "We then have".

[9/9/2020] On page 222, in equation (14.15), add a pair of parentheses to the denominator so that it is $1 - \left(\exp(l_0/n)\right)^2$.

[9/9/2020] On page 224, in equation (14.15), add a pair of parentheses to the denominator so that it is $1 - \left(\exp(l_0/n)\right)^2$.

[9/7/2020] On page 195, in the box before exercise 12.32, on the displayed line, replace the left side with $\ln \dfrac{\sum_{i \le j} \hat{\pi}_i}{1 - \sum_{i \le j} \hat{\pi}_i}$.

[9/2/2020] On page 64, in exercise 4.25, on the first line, change "experience (x_2)" to "experience (x_1)". On the second line, change $(x_3 = 1)$ to $(x_2 = 1)$ and change $(x_3 = 0)$ to $(x_2 = 0)$.

[8/30/2020] On page 153, two lines above Table 11.2, change $b(\theta) = \theta$ to $b'(\theta) = \theta$.

[8/13/2020] On page 142, in exercise 9.4(i), change $\bar{x}_2$ to $\bar{x}$.

[8/10/2020] On page 138, replace the solution to exercise 8.14 with:

The RSS at the fitted values is 34, and the penalty function is $(3^2 + 2^2)\lambda = 13\lambda$. At the three lower values of RSS in the table, we have:

(β_1, β_2)	RSS	Penalty function
(4,2)	16	$(4^2 + 2^2)\lambda = 20\lambda$
(3,3)	31	$(3^2 + 3^2)\lambda = 18\lambda$
(4,3)	33	$(4^2 + 3^2)\lambda = 25\lambda$

λ must be at least high enough so that the difference in penalty functions is greater than or equal to the difference in RSSs. In other words, $\lambda \ge$ Difference in RSS/Difference in penalty. The quotients are 18/7, 3/5, and 1/8, with the biggest difference, **18/7**, occurring at (4,2).

[8/10/2020] On page 334, in the solution to exercise 20.4, every $t - 20$ should be t, and the final answer is 5. Replace the solution with

The mean of the series is 50 and the current value $y_{20} = 60$, which is 10 higher than the mean. In the forecast of an AR(1) series, each excess of a term over the mean is β_1 times the excess of the previous term

over the mean. Here, $\beta_1 = 0.75$. We want the t such that $y_t = 53$, an excess of 3 over the mean, so we want $10(0.75^t) < 3$. Solving for t,

$$\begin{aligned} 10(0.75^t) &< 3 \\ 0.75^t &< 0.3 \\ t \ln 0.75 &< \ln 0.3 \\ t &> \frac{\ln 0.3}{\ln 0.75} = 4.185 \end{aligned}$$

The smallest t with $\hat{y}_{20+t} < 53$ is $\boxed{\mathbf{5}}$.

[6/16/2020] On page 208, in exercise 13.1, the last four lines of the table should be:

Family size	2	
1 or 2	0	0.000
3 or 4	1	0.137
5 or more	1	0.355

[11/21/2019] On page 91, replace the last three lines of the solution to Quiz 5-3 with

$$R^2_{(3)} = \frac{0.72}{1.72}$$

The VIF is

$$\text{VIF}_3 = \frac{1}{1 - 0.72/1.72} = \boxed{\mathbf{1.72}}$$

[11/18/2019] On pages 318–319 in each of the five formulas in Section 19.6, change the lower limit of the summation from $t = T_1$ to $t = T_1 + 1$.

[8/30/2019] On page 181, on the third line after "Cumulative logit and proportional odds models",, change $\Pr(Y \le j)$ to $\Pr(Y \le m)$.

[8/2/2019] On page 100, in the solution to exercise 6.6 statement II, on the first line, change "the higher the variance" to "the lower the variance".

[8/2/2019] On page 101, in the second bullet, on the second to third lines, change "cannot decrease the RSS and will almost surely increase it" to "cannot increase the RSS and will almost surely decrease it".