

## Errata and Updates for ASM Exam S (Third Edition Second Printing) Sorted by Date

[1/27/2018] On page 602, in exercise 50.20, in the table, change II on the last line to III. On the line below the table, change  $\beta_1 + \beta_2 = 1$  to  $\beta_2 + \beta_3 = 1$ .

[1/16/2018] On page 300, on the third line of the answer to Example 25K, the last denominator on the line should be raised to the fifth power, so that the fraction is

$$\frac{(\theta + 500)^{12}}{((\theta + 800)(\theta + 1200)^2)^5}$$

[10/19/2017] On page 946, replace the last line of the solution to question 9 with

$$\Pr(N \geq 2) = 1 - p_0 - p_1 = 1 - e^{-0.191625}(1 + 0.191625) = \frac{0.191625^2}{2} = \boxed{0.016175} \quad (\mathbf{B})$$

[9/27/2017] On page 535, since “dispersion parameter” is not defined in the current syllabus, delete exercise 45.5.

[9/27/2017] On page 554, four lines above Example 47B, change  $\frac{(-3)^2}{0.9}$  to  $\frac{(-3)^2}{0.7}$ .

[9/23/2017] On page 549, in the solution to exercise 46.7, on the fifth line, change 3.3479 to 3.2479.

[9/14/2017] On page 549, in the solution to exercise 46.10, on the fourth line, change  $\Phi(1.01)$  to  $\Phi(1.32)$ .

[8/11/2017] On page 517, on the third line of the third paragraph, change “20<sup>th</sup> percentile” to “15<sup>th</sup> percentile”.

[8/11/2017] On page 574, in the solution to exercise 48.9, on the last displayed line, change 2(7) to 2(6).

[8/11/2017] On page 680, in the solution to exercise 56.7, on the fourth line, put an exponent 2 on 3.375.

[8/6/2017] On page 185, in the solution to exercise 16.5, in the second bullet, change the + before  $1/(0.3 + 0.1)$  to =.

[8/2/2017] On page 723, in exercise 62.6, on the first line, change ARIMA(0,1,1) to ARIMA(0,0,1).

[8/2/2017] On page 725, in exercise 62.6, on the first line, change ARIMA(0,1,1) to ARIMA(0,0,1).

[6/25/2017] On page 95, on the third line of the answer to Example 9E, change  $1/(n - i)$  to  $1/(n - i + 1)$ .

[6/13/2017] On page 628, 6 lines below the end of the answer to Example 53A, change  $E[Y_{ij} = \mu]$  to  $E[Y_{ij}] = \mu$ .

[6/12/2017] On page 615, on the line above equation (51.2), change “ $i^{\text{th}}$  variable” to “ $i^{\text{th}}$  observation”.

[6/12/2017] On page 662, in the solution to exercise 54.7, on the first displayed line, replace the right side with

$$2 \left( \sum y_i \ln \hat{y}_i - \bar{y} \sum \ln y_i \right)$$

[6/5/2017] On page 562, in the solution to exercise 47.12, replace the second line with  $\mathbf{z} = \mathbf{X}\mathbf{b} + \mathbf{G}(\mathbf{y} - \boldsymbol{\mu})$ .

[6/5/2017] On page 566, on the second line of Example 48C, the matrix must be symmetric, so replace the 4 in the first row with 1.

[5/28/2017] On page 690, in exercise 58.6, on the last line, delete the subscript 2 on  $\alpha$ .

- [5/28/2017] On page 696, in exercise 59.1, on the first line, change  $\beta_t$  to  $\beta t$ .
- [5/28/2017] On page 701, on the second line of Example 60A, change  $w_{t+2}$  to  $w_{t-2}$ . On the last line, change “lag 1” to “lag 2”.
- [5/28/2017] On page 723, in exercise 62.5, on the first line, change the first  $w_t$  to  $y_t$ .
- [5/28/2017] On page 724, in the solution to exercise 62.5, change  $\hat{w}_{41}$  to  $\hat{y}_{41}$ ,  $\hat{w}_{42}$  to  $\hat{y}_{42}$ , and  $\hat{w}_{43}$  to  $\hat{y}_{43}$ . Do not change  $E[w_{42}]$ .
- [5/14/2017] On page 212, one line below Quiz 19-1, delete the word “not” both times it appears on that line. On the first line of Example 19D, replace “parallel set of series systems” with “series set of parallel systems”.
- [5/14/2017] On page 561, in the solution to exercise 47.8, on the fourth line, the left side of the equation should be  $\frac{\partial g}{\partial \pi_6}$
- [5/11/2017] On page 543, on the second-to-last displayed line, replace the left side with

$$\frac{\sum_{k=1}^j \pi_k}{1 - \sum_{k=1}^j \pi_k}$$

- [5/11/2017] On page 546, in the second equation under “Proportional odds model”, replace the left side with

$$\frac{\sum_{k=1}^j \pi_k}{1 - \sum_{k=1}^j \pi_k}$$

- [5/11/2017] On page 569, replace Quiz 48-3 with the following:  
 For a linear model, the negative loglikelihood is 158.06. You are considering adding a 4-category categorical variable to the model.  
 Determine the highest value of the negative loglikelihood for which the additional variable is accepted if the AIC is used to select models.
- [5/11/2017] On page 574, replace the solution to Quiz 48-3 with the following:  
 A 4-category variable adds 3 parameters to the model. The AIC penalty added to twice the negative loglikelihood increases by 6, so the negative loglikelihood must decrease by at least 3, to **155.06**.
- [5/11/2017] On page 662, in the solution to exercise 54.3, on the second line from the end, insert “ln” before the fraction  $\frac{3.5}{4.667}$ .
- [5/9/2017] On page 493, on the second line of the answer to Example 41D part 1, change  $\Phi(1.15)$  to  $\Phi(-1.15)$ .
- [5/9/2017] On page 615, in Example 51B, on the second line, replace “That example says that  $p = 2$  with “In that example,  $p = 3$ .”
- [5/9/2017] On page 837, in the solution to question 17, on the third line, change “or e” to “or 3”.
- [5/7/2017] On page 991, in the solution to question 26, on the third line, change  $\sigma_*$  to  $\sigma_*^2$
- [5/6/2017] On page 992, in the solution to question 34, on the second line, put a sum sign before  $\frac{(y_i - \mu)^2}{\sigma^2}$ .
- [4/30/2017] On page 698, replace the solution to exercise 59.3 with

By formula (58.2), the variance of the time series is

$$\gamma_0 = \frac{\sigma_w^2}{1 - \alpha_1^2} = \frac{25}{1 - 0.4^2} = 29.7619$$

and the autocorrelations are

$$\rho_k = \alpha_1^k = 0.4^k$$

Using formula (59.1),

$$\begin{aligned} \text{Var}(\bar{x}) &= \frac{\sigma^2}{n} (1 + 2(1 - 1/n)\rho_1 + 2(1 - 2/n)\rho_2 + \cdots + 2(1 - 4/n)\rho_4) \\ &= \frac{29.7619}{5} (1 + 2(0.8)(-0.4) + 2(0.6)(0.16) + 2(0.4)(-0.064) + 2(0.2)(0.0256)) \\ &= \boxed{3.0419} \end{aligned}$$

[4/28/2017] On page 588, in the solution to exercise 49.6, on the second line, replace  $\sum y_i^2$  with  $\sum (y_i - \bar{y})^2$ .

[4/28/2017] On page 783, in question 35, change the seventh line to

$$\sum \ln y_i = 160.6 \qquad \sum \ln \hat{y}_i = 160.0$$

[4/28/2017] On page 862, in the solution to question 35, change the last 3 lines to

$$D = 2 \sum \left( -\frac{y_i}{y_i} + \frac{y_i}{\hat{y}_i} - (\ln y_i - \ln \hat{y}_i) \right)$$

Using the values we're given for the sums,

$$D = 2(-50 + 50.1 - (160.0 - 160.6)) = \boxed{1.4} \quad (\mathbf{E})$$

[4/28/2017] On page 875, replace the last sentence of the solution to question 39 with the following:

From the likelihood ratio chi-square statistic and the loglikelihood of the minimal model, with  $l(\mathbf{b})$  being the loglikelihood of the model,

$$2(l(\mathbf{b}) - (-182)) = 20.2$$

So the loglikelihood of the model is  $l((b)) = -171.9$ . The AIC is  $2(-171.9) - 2(10) = \boxed{-363.8}$ . (A)

The AIC is  $-2(-183) + 20.2 + 10(2) = \boxed{404.2}$ . (C)

[4/27/2017] On page 538, in the solution to exercise 45.10, change the last line to

$$\mathbf{E}[Y] = -\frac{c'(\theta)}{b'(\theta)} = \theta = \frac{1}{\sqrt{0.6}} = \boxed{1.2910} \quad (\mathbf{D})$$

[4/27/2017] On page 688, in the answer to Example 58A, on the eighth line, change the  $w_t$  on the right side of the line to  $x_t$ .

[4/27/2017] On page 719, in the solutions to exercises 61.8–61.10, change (63.4) to (63.5).

[4/26/2017] On page 654, formula (54.6) should be

$$X^2 = \sum \frac{O_i^2}{E_i} - n \quad (1)$$

[4/23/2017] On page 553, in Example 47A, replace the third line with

$$\mu_i = \beta_1 + \beta_2 x_i$$

[4/23/2017] On page 554, in Example 47B, replace the third line with

$$\ln \mu_i = \beta_1 + \beta_2 x_i$$

[4/23/2017] On page 555, in Quiz 47-1, on the second line, change  $\mathbf{X}^T \mathbf{b}$  to  $\mathbf{Xb}$ .

[4/23/2017] On page 562, replace the last line of the page with

$$(\mathbf{Xb})_1 + G_{11}(y_1 - \mu_1) = 4.75 + e^{-4.75}(105 - e^{4.75}) = \boxed{4.6584}$$

[4/23/2017] On page 564, on the fourth line of the page, after the words “under consideration”, change  $\pi$  to  $\hat{\pi}$ .

[4/23/2017] On pages 564–565, on the last two lines of page 564 and the first line of page 565, replace every  $\theta$  with  $\theta_i$ , since  $\theta$  varies with  $y_i$ .

[4/20/2017] On page 369, in the solution to exercise 29.12, replace the second and third lines with:

$$\begin{aligned} 10 + 1.645\sqrt{\frac{600}{n}} &= 20 - 0.842\sqrt{\frac{600}{n}} \\ 2.487\sqrt{\frac{600}{n}} &= 10 \end{aligned}$$

[4/14/2017] On page 554, one line below equation (47.8), change  $\beta_1 \bar{x}$  to  $\beta_2 \bar{x}$ .

[4/14/2017] On page 784, in question 36, on the third line, change 1.10 to 5.15.

[4/14/2017] On page 862, in the solution to question 36, each subscript 1 should be 2 and each subscript 2 should be 3. The solution then reads

The numerator of the Wald statistic is the square of  $\mathbf{b}_2 - \mathbf{b}_3 - 1 = 3.28 - 5.15 - 1 = -2.87$ . The denominator is the variance of  $\mathbf{b}_2 - \mathbf{b}_3$ , which is

$$\text{Var}(\mathbf{b}_2) + \text{Var}(\mathbf{b}_3) - 2 \text{Cov}(\mathbf{b}_2, \mathbf{b}_3) = 1.60 + 1.32 - 2(0.85) = 1.22$$

The Wald statistic is  $(-2.87)^2/1.22 = 6.7516$ . Since there is one constraint only (namely,  $\beta_2 - \beta_3 = 1$ ), there is 1 degree of freedom. The critical values of chi-square at 1 degree of freedom are 6.63 at 1% significance and 7.88 at 0.5% significance. **(B)**

[4/13/2017] On page 517 in the last paragraph, delete all sentences past the first sentence through the end of the paragraph on page 518.

[4/13/2017] On page 937, in the solution to question 18, two lines from the end, put a negative sign in front of

$$\frac{4}{\ln \prod x_i}$$

[3/28/2017] On page 98, in the solution to exercise 9.3, replace the last line of the solution with:

Since the number of tomatoes is an integer, the integer generating maximum profit must be either 40 or 41. Computing profit for both:

$$180(1 - e^{-40/100} - 1.2(40)) = 11.34239$$

$$180(1 - e^{-41/100} - 1.2(41)) = 11.34295$$

We see that expected profit is maximized if **41** tomatoes are bought.

[3/28/2017] On page 111, replace the solution to exercise 10.3 with the following:

The probability that the number of reports in a time interval of size  $h$  is more than 1 is proportional to  $h$ , so it is not  $o(h)$ . The number of dollars of loss has the same problem, and also may not be an integer-valued random variable. **(A)**

[3/28/2017] On page 534, change the formula for Tweedie distributions to

$$\text{Var}(Y) = aE[Y]^p$$

[3/28/2017] On page 636, in Table 53.2, on the third-to-last line, change the formula for significance of treatments to

$$F_{k-1,(b-1)(k-1)} = \frac{\text{SSTR}/(k-1)}{\text{SSE}/((b-1)(k-1))}$$

On the last line, change the formula for significance of blocks to

$$F_{b-1,(b-1)(k-1)} = \frac{\text{SSB}/(b-1)}{\text{SSE}/((b-1)(k-1))}$$

[3/28/2017] On page 679, in the heading for the last formula of Table 56.1, change cvf to ccf.

[3/26/2017] On page 658, in part 2 of Table 54.1, switch “both columns” and “one column” between formulas (54.3) and (54.4).

[3/25/2017] On page 71, in the solution to exercise 5.2, on the second-to-last line, interchange 0.2/0.14 and 0.3/0.14 in the matrix.

[3/25/2017] On page 712, replace the solution to Quiz 60-2 with the following:

$$\begin{aligned} x_t &= (1 - 0.7\mathbf{B}^2)w_t \\ w_t &= (1 - 0.7\mathbf{B}^2)^{-1}x_t \\ &= (1 + 0.7\mathbf{B}^2 + 0.49\mathbf{B}^4 + 0.343\mathbf{B}^6)x_t \\ x_t &= w_t - 0.7x_{t-2} - 0.49x_{t-4} + 0.343x_{t-6} - \dots \end{aligned}$$

[3/24/2017] On page 978, in the solution to question 45, on the second line, change the first root 1 to  $-1$ .

[3/21/2017] On page 630, in the table near the bottom of the page,  $b - 1$  and  $k - 1$  are interchanged in the MS and F columns. The table should read as follows:

Source	df	SS	MS	F
Treatments	$k - 1$	SSTR	$\text{SSTR}/(k - 1)$	$F_{k-1,(b-1)(k-1)} = \text{MSTR}/\text{MSE}$
Blocks	$b - 1$	SSB	$\text{SSB}/(b - 1)$	$F_{b-1,(b-1)(k-1)} = \text{MSB}/\text{MSE}$
Error	$(b - 1)(k - 1)$	SSE	$\text{SSE}/((b - 1)(k - 1))$	
Total	$bk - 1$	SST		

- [2/28/2017] On page 184, in the solution to exercise 16.1, on the second line, change “mean 1.5” to “mean  $1/1.5$ ”.
- [2/11/2017] On page 954, in the solution to question 14, on the fourth line, insert a 2 before  $(828.37 - 826.23)$ .
- [2/5/2017] On page 455, in exercise 37.8, on the second to last line, add the word “mean” before “number”.
- [1/17/2017] On page 414, in exercise 32.18, change the first line of the second bullet to  
Sam submits  $X_i$  in premiums on day  $i$ , where  $X_i$  is expressed in millions. Summary statistics are:  
Change the first line of the fourth bullet to  
Vera submits  $Y_i$  in premiums on day  $i$ , where  $Y_i$  is expressed in millions. Summary statistics are: