

# ERATTA for Original Printing

July 31, 2014

*NOTE:* The original printing of *Applied Time Series Analysis* had several typos that have been corrected in more recent printings. While there is no indication in the front matter of the book concerning whether you have the “original” printing or the “revised” version, an easy way to check to see which version you have is the following:

On Figure 1.10, page 23:

- If the horizontal axes go from 0 to 1000 on all four plots you have the *original printing*.
- If the horizontal axes go from 0 to 100 on all four plots you have the *revised version*

## *Errata for Original Printing*

p. 14 – The line under (1.13) should read: “while the product can be written using first (ii) and then (i) as

p. 17 – Figure 1.7 Heading should read “Three realizations from the process in Example 1.4

p. 23 – Figure 1.10. Horizontal axes should be from 0 to 100 in all 4 plots

p. 34 – (c) Parzen window: the lower case  $m$  on the first line of the windows specification should be upper case. Also the limits for  $k$  on the first and last line should be  $|k| \leq M / 2$  and  $|k| > M$ , respectively, i.e. the left-hand side of the absolute value for  $k$  is missing.

p. 37 – last 2 lines should read: “data have a highly oscillatory nature, that is, they are predominantly high frequency with a period of about 2.”

p. 42 – Climatic Research Unit

p. 49 – Problem 1.6, the equation number (4.13) on the equation in the note should be removed.

p. 49 – Problem 1.6, the option to use in GW WINKS is `Generate Realization` instead of `Generate Series`.

p. 50 – Problem 1.11, second line: replace “Equation 1.31” with “Equation 1.35”

p. 50 – Problem 1.12 should read “Show  $Y_t$  is covariance stationary and that the autocovariance of  $Y_t$  is given by .... “

p. 54 – Last line of Theorem 2.1 before equation should read: “unique stochastic process,  $X_t$ , with  $E[X_t^2] < \infty$  such that, for each  $t$ ,”

p. 55 – The line below (2.4) should read:

$$\text{Moreover, } S_X(f) = \frac{|H(e^{-2\pi if})|^2 P_Z(f)}{\sigma_X^2}.$$

p. 70 – Problem 2.3: the last sentence should read, “How does it compare with the *high*-pass Butterworth filter for filtering out the frequency 0.05?”

p. 72 – Problem 2.9: the squared frequency response function in (a) should be

$$|H(e^{-2\pi if})|^2 = \frac{(f / .2)^8}{1 + (f / .2)^8}$$

p. 88 – 5 lines before the figure should begin “example are consistent *with* those discussed...”

p. 110 – On this page,  $a_{1j}$  and  $a_{2j}$  in the formulas should be changed to  $\alpha_{1j}$  and  $\alpha_{2j}$  respectively.

p. 131 – The formula for  $\gamma_1$  should read

$$\gamma_1 = \frac{(1 - \theta_2 - \phi_1^2 \theta_2 - \phi_1 \theta_1)(\phi_1 - \theta_1) + \phi_1 \theta_2^2}{1 - \phi_1^2} \sigma_a^2$$

p. 152 – Problem 3.3 should read “Determine whether the following models are stationary and explain your answers.”

p. 152 – Problem 3.5. Although referring to equation (3.46) is ok, it would have been better to refer to equation (3.49).

p. 153 – Problem 3.8 (a), the model should be  $X_t = a_t - 1.9a_{t-1} + .84a_{t-2}$ .

p. 153 – Problem 3.9 (a) (iii). Use Parzen instead of Tukey window. (The Tukey window often encounters numerical problems for realizations from this model)

p. 155 – Problem 3.20, part (iii). “>” should be replaced with “<”

p. 162 – Line 2 should read “and in fact,  $|\rho_k| = 1$  if  $2f_1 k$  is an integer.”

p. 168 – 8 lines from the bottom: The reference to Figure 4.7b should be to Figure 4.6b.

p. 170 – Line following Equation 4.22,  $\sigma_t^2$  should be replaced by  $\sigma_{t|t-1}^2$ .

p. 175 – Equation (4.31) should be  $\sigma_{t|t-1}^2 = 0.1 + 0.45a_{t-1}^2 + 0.45\sigma_{t-1|t-2}^2$

p. 188 – Line 3 should be “nonstationary factors of highest multiplicity in  $\lambda(B)$ .”

p.189 – 3 lines after Equation 5.15. “ARUMA(2,1,0) model in (5.15)” should be “ARUMA(1,2,0) model in (5.15)”

p. 193 – Last line should read “was used in Figure 5.6a....”

p. 195 – Problem 5.2 is more clearly stated as: Generate and plot four realizations from the AR(4) model in Equation 5.3, page 180. Do any of these realizations have a ‘linear-trending’ behavior?

p. 199 – 7 lines from the bottom:  $t_{0-1}$  should be  $t_0 - 1$

p. 204 – Second formula line at the top of the page: this should read

$$\hat{X}_n^{(T)}(2) = \bar{X} - \pi_1(\hat{X}_n^{(T)}(1) - \bar{X}) - \pi_2(X(n) - \bar{X}) - \dots - \pi_{n+1}(X(1) - \bar{X})$$

p.215 – Table 6.3: The 4 forecasts should be 51.40, 50.46, 49.73, and 49.42 to be consistent with Table 6.2.

p. 219 – 3 lines below equation (6.44).  $C_1$  and  $C_2$  should be  $C_1 = 3.72$  and  $C_2 = -8.15$

p. 231 – Problem 6.2. Make these changes:  $X_{50} = 144.67$ ,  $C_1 = 3.72$ ,  $C_2 = -8.15$

p. 232 – Problem 6.8 – the equation should be

$$\begin{pmatrix} \gamma_\ell \\ \gamma_{\ell+1} \\ \vdots \\ \gamma_{\ell+t_0-1} \end{pmatrix} = \begin{pmatrix} \gamma_0 & \gamma_1 & \cdots & \gamma_{t_0-1} \\ \gamma_1 & \gamma_0 & \cdots & \gamma_{t_0-2} \\ \vdots & & & \vdots \\ \gamma_{t_0-1} & \gamma_{t_0-2} & \cdots & \gamma_0 \end{pmatrix} \begin{pmatrix} c_1^* \\ c_2^* \\ \vdots \\ c_{t_0}^* \end{pmatrix},$$

i.e. the second row of the matrix should be changed from  $\gamma_1 \ \gamma_2 \ \cdots \ \gamma_{t_0-2}$  to  $\gamma_1 \ \gamma_0 \ \cdots \ \gamma_{t_0-2}$ .

p. 235 – Equation (7.1):  $\theta_1, \theta_2, \dots, \theta_q$  (i.e. replace  $p$  by  $q$  in the last subscript on this line of the equation)

p. 236 – Equation (7.3) should read  $\rho_k = \phi_1 \rho_{k-1} + \dots + \phi_p \rho_{k-p}$

- p. 237 – On the second line following equation (7.8)  $\hat{\phi}_{YW}$  should be changed to the bold form  $\hat{\phi}_{YW}$ .
- p. 238 – Line 5 in paragraph following Equation (7.9): “autocorrelations” should be replaced by “autocovariances”
- p. 242 – The next to last line of the Burg algorithm should read  

$$f_j^{(k)} = f_j^{(k-1)} + a_k^{(k)} b_{j-1}^{(k-1)}, \quad j = k + 1, \dots, n$$
- p. 244 – In the first line replace MA( $q$ ) with MA(1)
- p. 255 – Equation (7.46) should be  $(1 - 1.2B + 0.6B^2)(X_t - 50) = (1 - 0.5B)a_t$ . (missing right parenthesis)
- p. 259 – Last paragraph before Section 7.5.2 should begin: “In Example 7.9d, we compute...”
- p. 267 – Equation on bottom line: change  $\Gamma$  to  $\hat{\Gamma}$
- p. 268 – First equation on the page following the table: change  $\Gamma^{-1}$  to  $\hat{\Gamma}^{-1}$
- p. 268 – In the Table 7.8 title, the AR(2) model should be  $(1 - 1.9B + 0.9025B^2)X_t = a_t$
- p. 269 – In the Table 7.9 title, the AR(2) model should be  $(1 - 1.9B + 0.9025B^2)X_t = a_t$
- p. 275 – The last line before the Exercises should begin “ARUMA(2,3,0) spectral ...”
- p. 276 – Exercise 7.1 should begin: “Suppose an AR(4) model is to be fit to a time series realization of length  $n = 60$ , and the sample autocorrelations,  $\hat{\rho}_k$ ,  $k = 0, 1, \dots, 6$  were calculated to be 1, 0.69, 0.22, 0.22, 0.61, 0.77, and 0.47 with  $\hat{\sigma}_a^2 = 1$ .”
- p. 276 – Problem 7.2 should read “The following realization of length  $n = 15$  has been observed:
- p.276 – Problem 7.4 (C). This model is explosively nonstationary. Replace model (C) with  

$$(1 - 2.69B + 2.583B^2 - .891B^3)(X_t - 250) = a_t$$
- p. 288 – Theorem 8.1, first line should read “... that is  $\phi(B)\lambda(B)(X_t - \mu) = \theta(B)a_t, \dots$ ”
- p. 298 – 10<sup>th</sup> line after Equation (8.23):  $\Delta X_t$  should be replaced by  $\nabla X_t$
- p.303 – line 4. should read “Comparison of the factors in Table 8.5 with ...”
- p. 306 – first full sentence on line 2 – “Using Burg/Tsay, Tiao estimates for calculating AIC with  $P = 15$  and ...”

p.314 – In the Figure 8.A.3 title, it should read (d) sample *partial* autocorrelations

p.316 – In the Figure 8.A.4 title, it should read (d) sample *partial* autocorrelations

p. 332 – Lines 9 and 10 should read “... of the Ljung-Box statistic are 12 and 1 in this example.”

p.332 – Line 3 in the section about *Pennsylvania temperature data* should read “temperature data in Figure 8.9a using Burg/Tsay,Tiao estimates. The sample ...”

p. 347 – Last two lines before Section 9.5 should read, “... and using linear discriminant analysis (see Johnson and Wichern, 2007) to ascertain ...”

p. 349 - Problem 9.6: The constant in model A should be  $\alpha_0$  instead of  $a_0$ .

p. 358 – The line following equation (10.13) should read “where  $\mathbf{a}_t = (a_{t1}, a_{t2})'$  is a bivariate white noise process.”

p. 361 – 4<sup>th</sup> line of first full paragraph: In the equation at the beginning of the line the subscript on the first occurrence of  $\Phi$  should be 1.

p. 376 – 4<sup>th</sup> line after equation at top:  $\hat{\sigma}_a^2$  should be 0.0107

p. 390 – Immediately below “*State Equation*” on second line of 10.6.7.1: Some of the quantities should be in bold type. The second line should read  $\mathbf{U}\boldsymbol{\Psi}_t = \mathbf{U}\mathbf{D}\boldsymbol{\Psi}_{t-1} + \mathbf{V}_t$ ,

p. 394 – In the first line of the sequence of equations at the top of the page, the left hand side of the equal sign should be  $\boldsymbol{\Gamma}_t^{t-1}$  (i.e. the  $\Gamma$  should be in bold type)

p. 395 – Equation (10.A.2)” The final square bracket “]” before the comma should be a round bracket “)”

p. 395 – There are three instances in which the symbol  $\Gamma$  should be written in bold type:

(a) immediately following the equal sign in Equation (10.A.3)

(b) in the third (last) line of the sequences of equations following Equation (10.A.3) – the  $\Gamma$  inside the parentheses

(c) in the third (last) line of the sequence of equations immediately preceding Section 10.A.2 – the  $\Gamma$  inside the parentheses

p. 396 – 6 lines from the bottom: In the vector expression for  $\boldsymbol{\Psi}_{t-1,j}$ , the  $i$  in the first row should be  $j$ .

p. 407 – Figure 11.3. The horizontal axis label for (a) and (c) should be *Time* while for (b) and (d) it should be *Lag*.

p. 409 – Figure 11.4. The horizontal axis label for (a) should be *Time* while for (b), (c), and (d) it should be *Lag*.

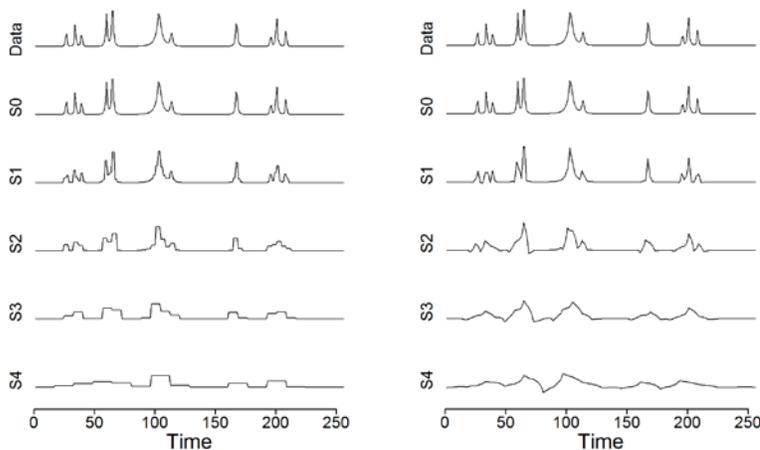
p. 416 – Figure 11.8. The horizontal axis label for (a) and (b) should be *Time* while for (c) and (d) it should be *Lag*.

p. 420 – Figure 11.9. The horizontal axis label for (a) and (b) should be *Time* and for (c) it should be *Lag*.

p. 421 – Figure 11.10. The horizontal axis label for (a) and (b) should be *Time* and for (c) it should be *Lag*.

p. 451 – line 2 of Step 1. Change “denote as  $s_{01}, s_{01}, \dots$ ” to “denote as  $s_{01}, s_{02}, \dots$ ”.

p. 456 – Figure 12.10. The  $S_4$  lines in both the left and right panels are incorrect. The correct versions of the plots are given in the following:



p. 487 – Figure 13.4

- Figure 13.4(b). The horizontal axis should be labeled “Transformed Time”
- Figure 13.4(d). The horizontal axis should be labeled “Frequency” and the limits should be from 0 to .5.
- Figure 13.4(f). The horizontal axis should be labeled “Transformed Time”

p. 488 – line 2. “ $1 - 1.6z + 0.99z^2 = 0 + 0.99z^2 = 0$ ” should be changed to “ $1 - 1.6z + 0.99z^2 = 0$ ”

p. 500 – line 11. Change “Figure 13.10e shows the Wigner-Ville” to “Figure 13.10f shows the Wigner-Ville”

p. 510 – Figure 13.6c. The horizontal axis should be labeled “Transformed Time”

References: Add

Johnson, R.A. and Wichern, D.W. (2007). *Applied Multivariate Statistical Analysis*,  
Prentice Hall: Englewood Cliffs, NJ