

# Errata Sheet (22 July 2009)

The following errors are all present in the original version of the book published in 1993. In 1998 the book was reprinted, and all of the errors listed below were corrected with the exception of those on pages 69, 163, 237, 241, 242, 252, 286, 326, 357, 358, 390, 423, 474 and 532 (indicated by daggers below).

- p. 27: An equation near the middle of the page should be  $\sum_{t=1}^N \cos(2\pi ft) \sin(2\pi f't) = S_N(f + f') - S_N(f - f')$ .
- p. 43–4: In Figure 44 and the last paragraph of page 43,  $\theta$  should be  $\theta_{1,1}$  for consistency.
- p. 53: The last sentence of Exercise [2.1] should say ‘... finite linear combinations of *pairwise uncorrelated* stationary processes ...’.
- p. 55: The last line of Exercise [2.8] should read ‘ $\text{var}\{\mathbf{a}^T \mathbf{W}\} = \mathbf{a}^T \Sigma \mathbf{a}$ .’
- p. 65: The right-hand side of (65a) is sometimes called the ‘Fourier synthesis of  $g(\cdot)$ ’ (rather than the ‘Fourier synthesis of  $G(\cdot)$ ,’ as is stated below the middle of the page).
- †p. 69: In the fourth line following the second displayed equation, ‘finite complex plane’ should be ‘entire complex plane’.
- p. 91: The last sentence of the first paragraph should have ‘ $G_{p,16}(\cdot)$ ’ rather than ‘ $G_{p,64}(\cdot)$ .’
- p. 122: In Exercise [3.11] there is a spurious ‘=’ sign in the formula following the words ‘Rewrite the above as.’
- p. 124: The last line should reference Exercise [3.3b] rather than [3.3a].
- p. 129: For clarity, the last row of Equation (129a) should have ‘ $-1/2 < f < 0$ ’ rather than ‘ $-1/2 \leq f < 0$ .’ Also, the sentence fragment following this equation should read ‘where  $df$  is a small positive increment such that  $0 < f + df < 1/2$  when  $0 < f < 1/2$ ’ rather than just ‘where  $df$  is a small positive increment.’
- p. 137: The first displayed equation should have ‘for  $1 \leq t \leq N$ ’ rather than ‘for  $0 \leq t \leq N$ .’
- p. 139: The statement of Wold’s theorem should reference Priestley (1981, p. 222).
- p. 140: The statement of the Wiener–Khintchine theorem should reference Priestley (1981, p. 219).
- p. 141: For clarity, the conditions stated in items [1] and [2] near the bottom of the page should read ‘ $S_1^{(I)}(1/2) > 0$ ,  $S_2^{(I)}(1/2) = 0$ ’ (rather than ‘ $S_1^{(I)}(f) \geq 0$ ,  $S_2^{(I)}(f) = 0$ ’) and ‘ $S_1^{(I)}(1/2) = 0$ ,  $S_2^{(I)}(1/2) > 0$ ’ (rather than ‘ $S_1^{(I)}(f) = 0$ ,  $S_2^{(I)}(f) \geq 0$ ’). Also, a reference for the Riemann–Lebesgue lemma is Titchmarsh (1939, p. 403).
- †p. 163: The output function  $g_p \star h_p(\cdot)$  in Figure 163 is incorrectly displayed for  $T/4 < |t| \leq T/2$ . We should have  $g_p \star h_p(t) = 3 - 8|t|/T$  for  $T/4 < |t| \leq 3T/8$  and  $g_p \star h_p(t) = 0$  for  $3T/8 < |t| \leq T/2$ .
- †p. 237: In the second line after Equation (237b),  $v_{\tau,M}$  should be  $v_{\tau,m}$ .
- †p. 241: In the fourth line after Equation (241a), ‘nonnegativity of  $S^{(d)}(f)$ ’ should be ‘nonnegativity of  $S^{(lw)}(f)$ ’.
- †p. 242: In the fourth line after Equation (242a), ‘ $W(f)$ ’ should be ‘ $W_m(f)$ ’.
- †p. 252: In the second displayed equation, ‘ $e^{i2\pi\eta q}$ ’ should be ‘ $e^{i2\pi\eta q \Delta t}$ ’.
- p. 286: The bottom row of the first displayed equation in item (4) should have  $w_{\tau-M,m}$  rather than  $w_{\tau-M,M}$ .

- †p. 286: In the last sentence in item (4),  $\tilde{W} * \tilde{S}^{(d)}(f'_k)$  should be  $\tilde{W} * \tilde{S}^{(d)}(f'_k)/M$ .
- p. 326: The displayed equation following ‘Show that’ in part a) of Exercise [6.10] is missing three  $C''$ 's: it should read

$$J(f_k) = -\frac{C'}{4}I(f_{k-1}) + \frac{C'}{2}I(f_k) - \frac{C'}{4}I(f_{k+1}).$$

- †p. 326: In Exercise [6.13], both terms on the right-hand side of the first displayed equation are missing a factor of  $(\Delta t)^2$ ; i.e., these terms should read

$$(\Delta t)^2 \left| \sum_{j=1}^N h_j C_j^*(f) e^{-i2\pi(f+\eta)j \Delta t} \right|^2 + (\Delta t)^2 \left| \sum_{j=1}^N h_j C_j(f) e^{-i2\pi(f+\eta)j \Delta t} \right|^2.$$

- p. 329: In parts b, c and d of Exercise [6.22], the complex exponentials are missing a factor of  $\Delta t$ ; e.g.,  $e^{i2\pi f'(l-1)}$  should be  $e^{i2\pi f'(l-1) \Delta t}$ . Also it should be stated explicitly that  $\{X_t\}$  is taken to have zero mean.
- p. 354: In the third line above Equation (354c),  $e^{-i2\pi f \tau}$  should be  $e^{-i2\pi f \tau \Delta t}$ .
- p. 356: For clarity, two occurrences of

$$\int_{f-W}^{f+W} S(f) df \text{ should be expressed as } \int_{f-W}^{f+W} S(f') df'.$$

- †p. 357: The last three displayed equations need to be modified to be the following:

$$\int_{-f(N)}^{f(N)} \tilde{\mathcal{H}}(f - f') df' = \Delta t \operatorname{tr} \{A^T A\}$$

(i.e.,  $\Delta t$  needs to be added before the trace);

$$S^{(bl)}(f) = \begin{cases} 1, & |f| \leq W; \\ 0, & W < |f| \leq f(N). \end{cases}$$

(i.e.,  $\Delta t$  needs to be replaced by 1); and

$$\begin{aligned} s_{\tau}^{(bl)} &= \int_{-f(N)}^{f(N)} e^{i2\pi f' \tau \Delta t} S^{(bl)}(f') df' \\ &= \int_{-W}^W e^{i2\pi f' \tau \Delta t} df' = \frac{\sin(2\pi W \tau \Delta t)}{\pi \tau \Delta t}, \end{aligned}$$

(i.e., the  $\Delta t$  in the integrand of the second integral needs to be moved to the denominator).

- †p. 358: The first two displayed equations need to be modified to be the following:

$$\int_{-W}^W \tilde{\mathcal{H}}(-f'') df'' = \Delta t \operatorname{tr} \{A^T \Sigma^{(bl)} A\}.$$

(i.e.,  $\Delta t$  needs to be added before the trace); and

$$b^{(b)}\{\hat{S}^{(q)}(f)\} \leq S_{\max} \Delta t \left( \text{tr}\{A^T A\} - \text{tr}\{A^T \Sigma^{(bl)} A\} \right),$$

(i.e.,  $\Delta t$  needs to be added before the left parenthesis).

p. 386: Equation (386) has a misplaced comma in the denominator.

p. 386: The last sentence of Section 8.2 should reference the FORTRAN routine ‘bessi0’ from Section 6.6 of *Numerical Recipes*, Second Edition (1992).

†p. 390: In the formula for  $\lambda_k(N, W)$  in Exercise [8.1], the ‘2’ just before the summation should be eliminated.

†p. 423: In first line, ‘no smaller than’ should be ‘no larger than’.

p. 424: In third line of the last paragraph, ‘Spectrum Estimation: an Impossibility?’ should be ‘Spectral Estimation: An Impossibility?’.

p. 431: Equation (431c) should have  $\hat{\sigma}_{(ml)}^2$  rather than  $\hat{\sigma}_{ml}^2$ .

p. 442: The seventh line states that the dots in Figure 441c are the same as the ones in the top plot of Figure 440; in fact, the dots are the postcolored version of the periodogram in Figure 441b.

p. 443: In item [3], the parenthetical qualifier ‘if any such process exists satisfying these  $q + 1$  constraints’ should be deleted: the process in question in fact always exists.

p. 449: In the top line,  $|G(f)|^{-2} = S(f)/\sigma_p^2$  should be  $|G(f)|^{-2} = S(f)/(\sigma_p^2 \Delta t)$ .

p. 454: The fraction 24/15 in the statement of Exercise [9.4] should have been reduced to 8/5.

p. 454: Equation (454) should be  $A_k = \left(1 - \bar{\phi}_{k-1, k-1}^2\right) A_{k-1} - \bar{e}_k^2(k-1) - \bar{e}_{N-k+1}^2(k-1)$ .

p. 455: In part a of Exercise [9.8], the denominators of the forward ls estimator (say,  $\hat{\phi}_{1,1,(f)}$ ) and backward ls estimator (say,  $\hat{\phi}_{1,1,(b)}$ ) have been reversed; i.e., they should be

$$\hat{\phi}_{1,1,(f)} = \frac{\sum_{t=2}^N X_t X_{t-1}}{\sum_{t=1}^{N-1} X_t^2} \quad \text{and} \quad \hat{\phi}_{1,1,(b)} = \frac{\sum_{t=2}^N X_t X_{t-1}}{\sum_{t=2}^N X_t^2}.$$

Also, since  $\sum_{t=1}^{N-1} X_t X_{t+1} = \sum_{t=2}^N X_t X_{t-1}$ , both numerators should have been expressed in the same way.

p. 455: In part c of Exercise [9.8], the condition ‘ $X_1 \neq X_2$ ’ should be ‘ $X_1 \neq \pm X_2$ .’

p. 461: The right-hand side of the next to last displayed equation should be  $-2H^T (\mathbf{X} - H\beta)$  (i.e., it is missing the factor of 2).

p. 467: The equation  $E\{|dZ_2(f)|^2\} = S_2^{(I)}(f)$  should be  $E\{|dZ_2(f)|^2\} = dS_2^{(I)}(f)$  (near the middle of the page).

†p. 474: The first line of first displayed equation should have  $\hat{D}_l^2$  rather than  $D_l^2$ .

p. 475: The second displayed equation should be

$$dS_2^{(I)}(f) = \sum_{l=1}^L D_l^2 [\delta(f - f_l) + \delta(f + f_l)] / 4 df$$

p. 485: In the next to last line, ‘0.007’ should be ‘0.003’.

- p. 506: In the seventh to last line, ‘closest frequency to 1 cycle/year’ should be ‘second closest frequency to 1 cycle/year’.
- p. 507: The first two displayed equations have two cosine terms rather than a cosine term and a sine term; i.e., they should be

$$g(t) = \frac{a_0}{2} + \sum_{l=1}^{\infty} a_l \cos(2\pi lt) + b_l \sin(2\pi lt)$$

and

$$g_t \equiv g(t \Delta t) = \frac{a_0}{2} + \sum_{l=1}^{\infty} a_l \cos(2\pi lt \Delta t) + b_l \sin(2\pi lt \Delta t). \quad (507a)$$

- p. 512: Tenth line from the bottom: 18.6 should be 18.5.
- p. 513: Last two sentences of first paragraph: 13.9 should be 13.8 in both sentences.
- p. 521: In item [5], ‘an order of magnitude larger’ should be ‘an order of magnitude smaller’.
- p. 532: In the displayed equation in the middle of the page just following ‘However, because  $z_l$  is a root, we have’, two occurrences of  $z^p$  should have been  $z_l^p$ .
- †p. 532: In the displayed equation in the middle of the page just following ‘so now we can write’, one occurrence of  $z^p$  should have been  $z_l^p$ .