

Errata List
of
"Digital Signal Processing: A Computer-Based Approach", Second Edition

Chapter 2

1. Page 48, Eq. (2.17): Replace " $y[n]$ " with " $x_u[n]$ ".
2. Page, 51: Eq. (2.24a): Delete " $\frac{1}{2}(x[n] + x^*[N-n])$ ". Eq. (2.24b): Delete " $\frac{1}{2}(x[n] - x^*[N-n])$ ".
3. Page 59, Line 5 from top and line 2 from bottom: Replace " $-\cos((\omega_1 + \omega_2 - \pi)n)$ " with " $\cos((2\pi - \omega_1 - \omega_2)n)$ ".
4. Page 61, Eq. (2.52): Replace " $A \cos((\Omega_o + k \Omega_T)t + \phi)$ " with " $A \cos(\pm(\Omega_o t + \phi) + k \Omega_T t)$ ".
5. Page 62, line 11 from bottom: Replace " $\Omega_T > 2\Omega_o$ " with " $\Omega_T > 2|\Omega_o|$ ".
6. Page 62, line 8 from bottom: Replace " $2\pi\Omega_o / \omega_T$ " with " $2\pi\Omega_o / \Omega_T$ ".
7. Page 65, Program 2_4, line 7: Replace " $x = s + d$;" with " $x = s + d$ ";".
8. Page 71, line 3 from top" Replace " $\delta[n - 4]$ " with " $\delta[n - 3]$ ".
9. Page 79, line 5 below Eq. (2.76): Replace " $\sum_{n=0}^{\infty} |\alpha^n|$ " with " $\sum_{n=0}^{\infty} |\alpha^n|$ ".
10. Page 81, Eq. (2.88): Replace " $\alpha_{L+1}\lambda_2^n + \alpha_N\lambda_{N-L}^n$ " with " $\alpha_{L+1}\lambda_2^n + \mathbf{L} + \alpha_N\lambda_{N-L}^n$ ".
11. Page 93, Eq. (2.116): Replace the lower limit " $n=-M+1$ " on all summation signs with " $n=0$ ".
12. Page 100, line below Eq. (2.140) and caption of Figure 2.38: Replace " $\omega_o = 0.03$ " with " $\omega_o = 0.06\pi$ ".
13. Page 110, Problem 2.44: Replace " $\{y[n]\} = \{-1, -1, 11, -3, -10, 20, -16\}$ " with " $\{y[n]\} = \{-1, -1, 11, -3, 30, 28, 48\}$ ", and " $\{y[n]\} = \{-14 - j5, -3 - j17, -2 + j5, -26 + j22, 9 + j12\}$ " with " $\{y[n]\} = \{-14 - j5, -3 - j17, -2 + j5, -9.73 + j12.5, 5.8 + j5.67\}$ ".
14. Page 116, Exercise M2.15: Replace "randn" with "rand".

Chapter 3

1. Page 118, line 10 below Eq. (3.4): Replace "real" with "even".

2. Page 121, Line 5 below Eq. (3.9): Replace " $\sum_{n=0}^{\infty} |\alpha^n|$ " with " $\sum_{n=0}^{\infty} |\alpha|^n$ ".
3. Page 125, Eq. (3.16): Delete the stray α .
4. Page 138, line 2 below Eq. (3.48): Replace "frequency response" with "discrete-time Fourier transform".
5. Page 139, Eq. (3.53): Replace " $x(n + mN)$ " with " $x[n + mN]$ ".
6. Page 139, lin2 2, Example 3.14: Replace " $x[n] = \{0 \ 1 \ 2 \ 3 \ 4 \ 5\}$ " with " $\{x[n]\} = \{0 \ 1 \ 2 \ 3 \ 4 \ 5\}$ ".
7. Page 139, line 3, Example 3.14: Replace " $x[n]$ " with " $\{x[n]\}$ ", and " $\pi k/4$ " with " $2\pi k/4$ ".
8. Page 139, line 6 from bottom: Replace " $y[n] = \{4 \ 6 \ 2 \ 3 \ 4 \ 6\}$ " with " $\{y[n]\} = \{4 \ 6 \ 2 \ 3\}$ ".
9. Page 141, Table 3.5: Replace " $N[g < -k >_N]$ " with " $N g[< -k >_N]$ ".
10. Page 142, Table 3.7: Replace " $\arg X[< -k >_N]$ " with " $-\arg X[< -k >_N]$ ".
11. Page 147, Eq. (3.86): Replace " $\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & j & -1 & -j \\ 1 & -1 & 1 & -1 \\ 1 & -j & -1 & j \end{bmatrix}$ " with " $\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -j & -1 & j \\ 1 & -1 & 1 & -1 \\ 1 & j & -1 & -j \end{bmatrix}$ ".
12. Page 158, Eq.(3.112): Replace " $\sum_{n=-\infty}^{-1} \alpha^n z^{-n}$ " with " $-\sum_{n=-\infty}^{-1} \alpha^n z^{-n}$ ".
13. Page 165, line 4 above Eq. (3.125); Replace "0.0667" with "0.6667".
14. Page 165, line 3 above Eq. (3.125): Replace "10.0000" with "1.000", and "20.0000" with "2.0000".
15. Page 165, line above Eq. (3.125): Replace "0.0667" with "0.6667", "10.0" with "1.0", and "20.0" with "2.0".
16. Page 165, Eq. (3.125): Replace "0.667" with "0.6667".
17. Page 168, line below Eq. (3.132): Replace " $z > |\lambda_1|$ " with " $|z| > |\lambda_1|$ ".
18. Page 176, line below Eq. (3.143): Replace " R_h " with " $1/R_h$ ".
19. Page 182, Problem 3.18: Replace " $X(e^{-j\omega/2})$ " with " $X(-e^{j\omega/2})$ ".

20. Page 186, Problem 3.42, Part (e): Replace " $\arg X[\langle -k \rangle_N]$ " with " $-\arg X[\langle -k \rangle_N]$ ".
21. Page 187, Problem 3.53: Replace "N-point DFT" with "MN-point DFT", replace " $0 \leq k \leq N-1$ " with " $0 \leq k \leq MN-1$ ", and replace " $x[\langle n \rangle_M]$ " with " $x[\langle n \rangle_N]$ ".
22. Page 191, Problem 3.83: Replace " $\lim_{n \rightarrow \infty}$ " with " $\lim_{z \rightarrow \infty}$ ".
23. Page 193, Problem 3.100: Replace " $\frac{P(z)}{D'(z)}$ " with " $-\lambda_1 \frac{P(z)}{D'(z)}$ ".
24. Page 194, Problem 3.106, Parts (b) and (d): Replace " $|z| < |\alpha|$ " with " $|z| > 1/|\alpha|$ ".
25. page 199, Problem 3.128: Replace " $(0.6)^\mu[n]$ " with " $(0.6)^n \mu[n]$ ", and replace " $(0.8)^\mu[n]$ " with " $(0.8)^n \mu[n]$ ".
26. Page 199, Exercise M3.5: Delete "following".

Chapter 4

1. Page 217, first line: Replace " ξ_N " with " ξ_M ".
2. Page 230, line 2 below Eq. (4.88): Replace " $\theta_g(\omega)$ " with " $\theta(\omega)$ ".
3. Page 236, line 2 below Eq. (4.109): Replace "decreases" with "increases".
4. Page 238, Eq. (4.114): Replace "2" outside the square brackets in the denominator with "4".
5. Page 241, line 3 from bottom: Replace " ω_p " with " $\omega_p = \pi/2$ ".
6. Page 241, line 2 from bottom: Replace " $0 \leq k \leq L-1$ " with " $1 \leq k \leq L$ ".
7. Page 241, last line from bottom: Replace " ω_o " with " $\omega_o = \pi/2$ ".
8. Page 241, line 1 below Figure 4.24: Replace " $0 \leq k \leq L-1$ " with " $1 \leq k \leq L$ ".
9. Page 246, line 4 below Eq. (4.132): Replace " $\theta_c(e^{j\omega})$ " with " $\theta_c(\omega)$ ".
10. Page 265, Eq. (4.202): Replace "1,2,K,3" with "1,2,3".
11. Page 279, Problem 4.18: Replace " $|H(e^{j0})|$ " with " $|H(e^{j\pi/4})|$ ".
12. Page 286, Problem 4.71: Replace " $z_3 = -j0.3$ " with " $z_3 = -0.3$ ".

13. Page 291, Problem 4.102: Replace

$$"H(z) = \frac{0.4 + 0.5z^{-1} + 1.2z^{-2} + 1.2z^{-3} + 0.5z^{-4} + 0.4z^{-5}}{1 + 0.9z^{-2} + 0.2z^{-4}}" \text{ with}$$

$$"H(z) = \frac{0.1 + 0.5z^{-1} + 0.45z^{-2} + 0.45z^{-3} + 0.5z^{-4} + 0.1z^{-5}}{1 + 0.9z^{-2} + 0.2z^{-4}}".$$

14. Page 295, Problem 4.125: Insert a comma "," before "the autocorrelation".

Chapter 5

1. Page 302, line 7 below Eq. (5.9): Replace "response" with "spectrum".

2. Page 309, Example 5.2, line 4: Replace "10 Hz to 20 Hz" with "5 Hz to 10 Hz". Line 6: Replace "5k + 15" with "5k + 5". Line 7: Replace "10k + 6" with "5k + 3", and replace "10k - 6" with "5(k+1) - 3".

3. Page 311, Eq. (5.24): Replace " $G_a(j\Omega - 2k(\Delta\Omega))$ " with " $G_a(j(\Omega - 2k(\Delta\Omega)))$ ".

4. Page 318, Eq. (5.40): Replace " $H(s)$ " with " $H_a(s)$ ", and replace "" with "".

5. Page 321, Eq. (5.54): Replace " $d_{N-1}s$ " with " $d_{N-1}s^{N-1}$ ".

6. Page 333, first line: Replace " Ω_{p1} " with " $\hat{\Omega}_{p1}$ ", and " Ω_{p2} " with " $\hat{\Omega}_{p2}$ ".

7. Page 334, last line: Replace " $-\hat{\Omega}_{s2} \leq \hat{\Omega} \leq -\hat{\Omega}_{s1}$ " with " $-\hat{\Omega}_{p1} \leq \hat{\Omega} \leq \hat{\Omega}_{p1}$ ", and " $\hat{\Omega}_{s2} \leq \hat{\Omega} \leq \hat{\Omega}_{s1}$ " with " $\hat{\Omega}_{p2} \leq |\hat{\Omega}| \leq \infty$ ".

8. Page 349, line 9 from bottom: Replace " $1/T$ " with " $2\pi/T$ ".

9. Page 354, Problem 5.8: Interchange " Ω_1 " and " Ω_2 ".

10. Page 355, Problem 5.23: Replace "1 Hz" in the first line with "0.2 Hz".

11. Page 355, Problem 5.24: Replace "1 Hz" in the first line with "0.16 Hz".

Chapter 6

1. Page 394, line 4 from bottom: Replace "alpha1" with "flip1r(alpha1)".

2. Page 413, Problem 6.16: Replace

$$"H(z) = b_0 + b_1 \left(z^{-1} + b_2 z^{-1} \left(z^{-1} + b_3 z^{-1} \left(1 + \mathbf{L} + b_{N-1} z^{-1} (1 + b_N z^{-1}) \right) \right) \right)" \text{ with}$$

$$"H(z) = b_0 + b_1 z^{-1} \left(1 + b_2 z^{-1} \left(z^{-1} + b_3 z^{-1} \left(1 + \mathbf{L} + b_{N-1} z^{-1} (1 + b_N z^{-1}) \right) \right) \right)".$$

3. Page 415, Problem 6.27: Replace " $H(z) = \frac{3z^2 + 18.5z + 17.5}{(2z + 1)(z + 2)}$ " with

$$"H(z) = \frac{3z^2 + 18.5z + 17.5}{(z + 0.5)(z + 2)}".$$

4. Page 415, Problem 6.28: Replace the multiplier value "0.4" in Figure P6.12 with "-9.75".
5. Page 421, Exercise M6.1: Replace " $-7.6185z^{-3}$ " with " $-71.6185z^{-3}$ ".
6. Page 422, Exercise M6.4: Replace "Program 6_3" with "Program 6_4".
7. Page 422, Exercise M6.5: Replace "Program 6_3" with "Program 6_4".
8. Page 422, Exercise M6.6: Replace "Program 6_4" with "Program 6_6".

Chapter 7

1. Page 426, Eq. (7.11): Replace " $h[n - N]$ " with " $h[N - n]$ ".
2. Page 435, line 4 below Figure 7.6: Replace the transfer function given with
- $$"G(z) = \frac{0.954965 - 1.1226287z^{-1} + 0.954965z^{-2}}{1 - 1.1226287z^{-1} + 0.90993z^{-2}}".$$
3. Page 436, line 14 from top: Replace "(5.32b)" with "(5.32a)".
4. Page 438, line 17 from bottom: Replace "(5.60)" with "(5.59)".
5. Page 439, line 13 from bottom: Replace "higher" with "lower", and " $\hat{\Omega}_{s2} = 2.735355$ " with " $\hat{\Omega}_{s1} = 0.577327$ ".
6. Page 439, line 10 from bottom: Replace the equation here with
- $$"\Omega_s = \frac{1.393733 - 0.3332788}{0.5773031 \times 0.777771} = 2.3617627".$$
7. Page 439, line 8 from bottom: Replace "2.8618058" with "2.3617627".
8. Page 439, line 7 from bottom: Replace "50" with "40".
9. Page 440, line below Figure 7.9 caption: Replace "2.8618058" with "2.3617627".
10. Page 440, line 8 from bottom: Replace "0.7810457" with "0.777771".
11. Page 440, last line: Replace the equation with " $\Omega_p = \frac{0.5095254 \times 0.777771}{1.393733 - 0.3332787} = 0.4234126$ ".
12. Page 441, line 5 below Figure 7.10 caption: Replace "0.3494297" with "0.4234126".

13. Page 442, line below Eq. (7.42): Replace " $F^{-1}(\hat{z})$ " with " $1 / F(\hat{z})$ ".
14. Page 442, line above Eq. (7.43): Replace " $F^{-1}(\hat{z})$ " with " $F(\hat{z})$ ".
15. Page 442, Eq. (7.43): Replace it with " $F(\hat{z}) = \pm \prod_{l=1}^L \left(\frac{\hat{z} - \alpha_l}{1 - \alpha_l^* \hat{z}} \right)$ ".
16. Page 442, line below Eq. (7.43): Replace "where $|\alpha_1|$ " with "where α_1 ".
17. Page 443, Eq. (7.47): Replace "0.2172235" in the numerator with "0.13402309".
18. Page 445, line 5 from bottom: Replace "0.2187917" with "0.218791", "-0.09100602" with "0.09613592", "0.7460066" with "-0.255685283", and "" with "0.341493".
19. Page 446, Eq. (7.51): Replace " $\beta(1 - \alpha)$ " with " $\beta(1 + \alpha)$ ".
20. Page 448, Eq. (7.58): Replace " $\omega_c < \omega \leq \pi$ " with " $\omega_c < |\omega| \leq \pi$ ".
21. Page 453, line 6 from bottom: Replace " $\omega_p - \omega_s$ " with " $\omega_s - \omega_p$ ".
22. Page 457, line 8 from bottom: Replace "length" with "order".
23. Page 459, line 3 from bottom: Replace "length N" with "order 2M".
24. Page 459, Eq. (7.89): Change equation to " $P = 1.248(\Delta\omega)M$ ".
25. Page 465, line 5 from top: Add "at $\omega = \omega_i$ " before "or in".
26. Page 500, Problem 7.15: Replace "2 kHz" in the second line with "0.5 kHz".
27. Page 502, Problem 7.22: Replace Eq. (7.158) with " $H_a(s) = \frac{Bs}{s^2 + Bs + \Omega_0^2}$ ".
28. Page 502, Problem 7.25: Replace "7.2" with "7.1".
29. Page 503, Problem 7.34: Replace "7.15" with "7.14".
30. Page 504, Problem 7.41: Replace " $H_{\text{int}}(e^{j\omega}) = e^{-j\omega}$ " in Eq. (7.161) with " $H_{\text{int}}(e^{j\omega}) = \frac{1}{j\omega}$ ".
31. Page 505, Problem 7.46: Replace "16" with "9" in the third line from bottom.
32. Page 505, Problem 7.49: Replace "16" with "9" in the second line.
33. Page 506, Problem 7.50: Replace "7.26(a)" with "7.25(a)", and "7.26(b)" with "7.25(b)".
34. Page 510, Exercise M7.2: Replace "Eq. (5.36)" with "Eq. (5.33)".
35. Page 510, Exercise M7.3: Replace "Program 7_5" with "Program 7_3".

36. Page 510, Exercise M7.4: Replace "Program 7_7" with "M-file impinvar".
37. Page 510, Exercise M7.6: Replace "Program 7_4" with "Program 7_2".
38. Page 511, Exercise M7.16: Replace "length" with "order".
39. Page 512, Exercise M7.24: Replace "length" with "order".

Chapter 8

1. Page 518, line 4 below Eq. (6.7): Delete "set" before "digital".
2. Page 536, Eq. (8.31): Replace " $x[n]$ " with " $x_e[n]$ ".
3. Page 536, line 5 from bottom: Replace " $x[n]$ " with " $x_e[n]$ ".
4. Page 537, Eq. (8.38a): Replace " $x[n]$ " with " $x_e[n]$ ".
5. Page 540, line 3 above Eq. (8.39): Replace " $G[k]$ " with " $X_0[k]$ " and " $H[k]$ " with " $X_1[k]$ ".
6. Page 574, Problem 8.11: Replace
" $\{2 \ 0 \ -5 \ -10 \ -10 \ 15 \ 90 \ 185 \ 125 \ -455 \ -1830\}$ " with
" $\{2 \ 0 \ -5 \ -10 \ -10 \ 55 \ -45 \ 40 \ -125 \ 140 \ -15\}$ ".

Chapter 9

1. Page 595, line 2 below Eq. (9.30c): Replace "this vector has" with "these vectors have".
2. Page 600, line 6 below Figure 9.13: Replace " $1/T$ " with " $2\pi/T$ ".
3. Page 601, line 2 below Eq. (9.63): Replace " 2^b " with " 2^{-b} ".
4. Page 604, Eq. (9.76): Replace " $2\Phi(K) - 1 = \sqrt{\frac{2}{\pi}} \int_0^K e^{-y^2/2} dy$ " with
" $2\Phi(K/2) - 1 = \sqrt{\frac{2}{\pi}} \int_0^{K/2} e^{-y^2/2} dy$ ".
5. Page 616, line above Eq. (9.121): Replace " $\|\bar{F}_r\|_p$ " with " $\bar{F}_r(z)$ ".
6. Page 619, Eq. (9.130): Replace " $\mathbf{l} = 1,2,3$ " with " $\mathbf{l} = 0,1,2$ ".
7. Page 627, Table 9.5, last entry: Replace " $\frac{1-\alpha^2}{2\sigma_0^2}$ " with " $\frac{(1-|\alpha|)^2}{2\sigma_0^2}$ ".

8. Page 651, Problem 9.10, line 2 from bottom: Replace " $\left(\frac{a_k z + 1}{1 + a_k z}\right)$ " with " $\left(\frac{a_k z + 1}{z + a_k}\right)$ ".

9. Page 653, Problem 9.15, line 7: Replace "two cascade" with "four cascade".

10. Page 653, Problem 9.17: Replace " $A_2(z) = \frac{d_1 d_2 + d_1 z^{-1} + z^{-2}}{1 + d_1 z^{-1} + d_1 d_2 z^{-2}}$ " with

$$"A_2(z) = \frac{d_2 + d_1 z^{-1} + z^{-2}}{1 + d_1 z^{-1} + d_2 z^{-2}}."$$

11. Page 654, Problem 9.27: Replace "structure" with "structures".

12. Page 658, Exercise M9.9: Replace "*alpha*" with " α ".

Chapter 10

1. Page 692, Eq. (10.57b): Replace " $P_0(\alpha_1) = 0.2469$ " with " $P_0(\alpha_1) = 0.7407$ ".

2. Page 693, Eq. (10.58a): Replace " $P_{-2}(\alpha_1)$ " with " $P_{-1}(\alpha_1)$ ".

3. Page 693, Eq. (10.58b): Replace " $P_0(\alpha_2) = -0.4321$ " with " $P_0(\alpha_2) = -1.2963$ ", and " $P_2(\alpha_1)$ " with " $P_1(\alpha_1)$ ".

4. Page 694, Figure 10.38(c): Replace " $P_{-2}(\alpha_0)$ " with " $P_1(\alpha_0)$ ", " $P_{-1}(\alpha_0)$ " with " $P_0(\alpha_0)$ ", " $P_0(\alpha_0)$ " with " $P_{-1}(\alpha_0)$ ", " $P_1(\alpha_0)$ " with " $P_{-2}(\alpha_0)$ ", " $P_{-2}(\alpha_1)$ " with " $P_1(\alpha_1)$ ", " $P_{-1}(\alpha_1)$ " with " $P_0(\alpha_1)$ ", " $P_0(\alpha_1)$ " with " $P_{-1}(\alpha_1)$ ", " $P_1(\alpha_1)$ " with " $P_{-2}(\alpha_1)$ ", " $P_{-2}(\alpha_2)$ " with " $P_1(\alpha_2)$ ", " $P_{-1}(\alpha_2)$ " with " $P_0(\alpha_2)$ ", " $P_0(\alpha_2)$ " with " $P_{-1}(\alpha_2)$ ", and " $P_{-1}(\alpha_2)$ " with " $P_{-2}(\alpha_2)$ ".

5. Page 741, Problem 10.13: Replace "2.5 kHz" with "1.25 kHz".

6. Page 741, Problem 10.20: Replace " $\sum_{i=0}^N z^i$ " with " $\sum_{i=0}^{N-1} z^i$ ".

7. Page 743, Problem 10.28: Replace "half-band filter" with a "lowpass half-band filter with a zero at $z = -1$ ".

8. Page 747, Problem 10.50: Interchange " \mathbf{Y}_k " and "the output sequence $y[n]$ ".

9. Page 747, Problem 10.51: Replace the unit delays " z^{-1} " on the right-hand side of the structure of Figure P10.8 with unit advance operators " z ".

10. Page 749, Eq. (10.215): Replace " $3H^2(z) - 2H^2(z)$ " with " $z^{-2}[3H^2(z) - 2H^2(z)]$ ".

11. Page 751, Exercise M10.9: Replace "60" with "61".

12. Page 751, Exercise M10.10: Replace the problem statement with "Design a fifth-order IIR half-band Butterworth lowpass filter and realize it with 2 multipliers".
13. Page 751, Exercise M10.11: Replace the problem statement with "Design a seventh-order IIR half-band Butterworth lowpass filter and realize it with 3 multipliers".

Chapter 11

1. Page 758, line 4 below Figure 11.2 caption: Replace "grid" with "grid;".
2. Page 830, Problem 11.5: Insert " $g_a(t) = \cos(200\pi t)$ " after "signal" and delete " $= \cos(200\pi n)$ ".
3. Page 831, Problem 11.11: Replace "has to be a power-of-2" with " $= 2^n$, where n is an integer".