Introduction to Signal Processing – S. J. Orfanidis
Errata List – December 5, 2007

(Errata with an asterisk * have been corrected in the second printing.)

p.13* In line 15 from top, instead of $\sin((2\pi n/4 + 2\pi mn)$, read $\sin(2\pi n/4 + 2\pi mn)$.

p.52* In fourth line from bottom, $\arg H(f) = \phi(f) + \pi \operatorname{sign} G(f)$ should be $\arg H(f) = \phi(f) + \pi\,(1 - \operatorname{sign} G(f))/2$.

p.58* In the last line of Problem 1.8(c), instead of $f_s = 4$ *kHz*, read $f_s = 4$ *Hz*.

p.358* In line 8 from top, instead of *except at the 4th roots*, read *except at the 8th roots*.

p.568* In Eq. (10.4.1), instead of $D = (A_g - 13)/14.36$, read $D = (A_g - 13)/14.6$.

p.628* In line 7 from top, the correct expression for $C_4(x)$ should be $C_4(x) = 8x^4 - 8x^2 + 1$.

p.786* The title of Ref. [268] should read "The Equivalence of Various Methods of Computing Biquad Coefficients for Audio Parametric Equalizers".

p.15 In second line from the top, instead of $f_3 = \pm 1.5$ kHz, read $f_4 = \pm 1.5$ kHz.

p.37 The Poisson sum identity in the middle of the page should be corrected to read:

$$\frac{1}{T}\sum_{m=-\infty}^{\infty}\frac{1}{a + 2\pi j(f - mf_s)} = \frac{1}{1 - e^{-aT}e^{-2\pi jfT}} - \frac{1}{2}$$

This requires that the sampled signal $x(nT)$ of Example 1.5.2 be redefined such that $x(0) = 1/2$ instead of $x(0) = 1$, which gives at the top of page 37:

$$\hat{X}(f) = \sum_{n=0}^{\infty} x(nT)e^{-2\pi jfTn} = \sum_{n=0}^{\infty}\Big(e^{-aTn} - \frac{1}{2}\delta(n)\Big)e^{-2\pi jfTn} = \frac{1}{1 - e^{-aT}e^{-2\pi jfT}} - \frac{1}{2}$$

The Poisson summation formula requires that the signal $x(t)$ be continuous for all t. The present example has a discontinuity at $t = 0$ arising from the unit step $u(t)$. Choosing $x(0)$ to be equal to $\big(x(0+) + x(0-)\big)/2 = (1+0)/2 = 1/2$, enables the use of the Poisson summation formula. The issue has been discussed in connection with the impulse-invariance filter design method.[1] Except for a level shift, the basic conclusions of this example remain the same. Similar redefinitions must be introduced also in Problem 1.13.

The above Poisson sum identity can be found in standard mathematical tables.[2] Indeed, setting $z = (2\pi fT - jaT)/2$, it is not hard to verify that the identity takes on the standard form:

$$\cot z = \sum_{m=-\infty}^{\infty}\frac{1}{z - \pi m} = \frac{1}{z} + 2z\sum_{m=1}^{\infty}\frac{1}{z^2 - \pi^2 m^2}$$

p.45 In second equation from top, the last expression should read $\int_{-f_s/2}^{f_s/2} Te^{2\pi jft}\,df$.

p.55 In line 16 from top, instead of $[f_s/2, f_s/2]$, read $[-f_s/2, f_s/2]$.

p.58 In bottom two equations, instead of $\cos\big(2\pi(f - f_0)\big)$, read $\cos\big(2\pi(f - f_0)T\big)$, and instead of $\cos\big(2\pi(f - f_0)L\big)$, read $\cos\big(2\pi(f - f_0)LT\big)$.

p.73 In second line from top, instead of "staircase A/D converter", read "staircase D/A converter".

p.121 In Problem 3.5, the term $3(0.5)^{n-1}u(n)$ should be $3(0.5)^{n-1}u(n-1)$.

p.142 Line 13 from bottom. Instead of "the include file", read "the include-file".

p.167 Line 8 from bottom. Instead of "We have from Eq. (4.2.20)", read "We have from Eq. (4.2.19)".

p.214 Problem 5.2(d) should read $x(n) = u(-n + 5)$. Also, replace 0.9 by 0.8 throughout Problem 5.4.

p.241 In line 6 from bottom, instead of Example 6.3.4, read Example 6.3.2.

p.311 In Problem 7.1, instead of "A system has impulse response", read "A system has transfer function".

p.485 In line 7 from bottom, instead of $z^{-2}x_3 + z^{-3}z_3$, read $z^{-2}x_2 + z^{-3}x_3$.

p.530 The third line of Eq. (9.9.14) should read: $\mathbf{y}_2 = \tilde{\mathbf{y}}_2 = \text{IFFT}\big(\text{FFT}(\mathbf{h}) \cdot \text{FFT}(\mathbf{x}_2)\big)$

[1] R. A. Gabel and R. A. Roberts, *Signals and Linear Systems*, 3/e, Wiley, New York, 1987; L. B. Jackson, "A Correction to Impulse Invariance," *IEEE Signal Process. Lett.*, **7**, 273 (2000); W. F. G. Mecklenbräuker, "Remarks on and Correction to the Impulse Invariant Method for the Design of IIR Digital Filters," *Signal Process.*, **80**, 1687 (2000).

[2] M. Abramowitz and I. A. Stegun, Eds., *Handbook of Mathematical Functions*, Dover, New York, 1968, p.75.

p.531 On bottom of Figure 9.9.1, the indicated absolute times $n = N, 2N, 3N$ should be $n = (N-M), 2(N-M), 3(N-M)$.

p.545 In the third equation from bottom, the entries $\sqrt{2}/10\pi$ in the vector $\mathbf{h}$ should be replaced by $-\sqrt{2}/10\pi$.

p.583 On line 12 from bottom, instead of $b = (1-a)/2 = 0.9023$, read $b = (1+a)/2 = 0.9023$.

p.611 On the text line after Eq.(11.6.23), instead of a_{2i}, read a_{i2}.

p.613 In line 2 from top, instead of 1/0.7625, read 1/0.7265.

p.617 In line 10 from top, instead of Eqs. (11.6.26) and (11.6.24), read Eqs. (11.6.33) and (11.6.35).

p.618 On the lower left of Fig. 11.6.6, the stopband marking $1/(1+\varepsilon^2_{\text{pass}})$ should read $1/(1+\varepsilon^2_{\text{stop}})$.

p.625 On the $i = 0$ row of the coefficient table, instead of -0.3904, read $+0.3904$.

p.626 On the $i = 0$ row of the coefficient table, instead of -0.3902, read $+0.3902$.

p.638 In line 7 from top, the expression for the coefficient a_{i3} should have an overall minus sign.

p.638 In lines 5 and 14 from top, the factor c should be removed from the numerator of the expression for the coefficient b_{i2}.

p.676 On line 9 from bottom, instead of $k' = 4n-4,\ 4n,\ 4n+8,\ 4n+8$, read $k' = 4n-4,\ 4n,\ 4n+4,\ 4n+8$.

p.700 On line 10 from bottom, instead of $[-f'_s/2, f'_s\,2]$, read $[-f'_s/2, f'_s/2]$.

p.760 On the 6th comment line of `sgfilt.m`, instead of $B(:,i) = \mathbf{b}_{M+1-i}$, read $B(:,i) = \mathbf{b}_{i-M-1}$.

p.776 In Reference [75], instead of Zölser, read Zölzer.

p.783 Reference [213] should read: **5**, 187 (1986).

p.786 The page no. of Ref. [265] should be 876, instead of 479.