Errata for the **1st** Edition, **3rd** to the **6th** Printings,
of "*Understanding Digital Signal Processing*", **(First Edition)**
by Richard Lyons

I really do beg your pardon for these "errors".
At least we have the consolation that, unlike
many books, a list of corrections is available.
(Although the following list looks long, it only
takes a few minutes to go through the book and
make these corrections.)

I realize now, that the "review process" I conducted,
and the subsequent review process of the publisher,
were not nearly as thorough as they should have been.

On page 52, the incorrect letter "*v*" in the third line of
Eq. (3-4d) should be replaced with a "·" multiplication symbol.

On page 69, in equation (3-20) the second "x(3)"
should be "x(5)".

On page 71, in the list of x(n)'s in the middle of the
page, the second "x(3)" should be "x(5)".

On page 82, in equations (3-29) and (3-30), change the
angles "2*pi*n/N" to "2*pi*n/(N-1)". The original
equations were valid for larger-sized FFTs, but the change
makes the equations valid for all FFT lengths.

On page 102, at the top of the page, delete that derivative:
      d[X(m)]/dm. It shouldn't be there.

On page 124, there's a missing minus sign in the exponent
of the 2nd term of Eq. (3-73). It should be:
      ... + e^-j[pi(k+m)-pi(k+m)/N]...

Page 140: Replace everything thing from the top of the
page down to, and including, Eq. (4-24) with the following:

$$A(m) = \sum_{n=0}^{(N/2)-1} x(2n)W_{N/2}^{nm} = \sum_{n=0}^{(N/4)-1} x(4n)W_{N/2}^{2nm} + \sum_{n=0}^{(N/4)-1} x(4n+2)W_{N/2}^{(2n+1)m} . \qquad (4\text{-}22)$$

Because $W_{N/2}^{2nm} = W_{N/4}^{nm}$ we can express $A(m)$ in the form of two $N/4$-point DFTs, as

$$A(m) = \sum_{n=0}^{(N/4)-1} x(4n)W_{N/4}^{nm} + W_{N/2}^{m} \sum_{n=0}^{(N/4)-1} x(4n+2)W_{N/4}^{nm} \qquad (4\text{-}23)$$

Notice the similarity between Eq. (4-23) and Eq. (4-20). This capability to subdivide an *N*/2-point DFT
into two *N*/4-point DFTs gives the FFT it's capacity to greatly reduce the number of necessary
multiplications to implement DFTs. (We're going to demonstrate this shortly.) Following the same
steps we used to obtained *A*(*m*), we can show that Eq.(4-21)'s *B*(*m*) is

$$B(m) = \sum_{n=0}^{(N/4)-1} x(4n+1)W_{N/4}^{nm} + W_{N/2}^{m} \sum_{n=0}^{(N/4)-1} x(4n+3)W_{N/4}^{nm}$$ (4-24)

On page 202, there's a major "foul up".
Eq. (5-23) defines the group delay REGARDLESS of the
number of taps in a FIR filter (having symmetrical
coefficients). So the correction is to completely
delete Eq. (5-23'), equation 5-23prime! Also delete
the "odd" subscript after the "G" in Eq. (5-23).
Delete the text "when S is odd, and" following
Eq. (5-23) and delete the text "when S is even,"
following Eq. (5-23'). I beg your pardon for this error.

On page 206, the upper limit of the summation in
Eq. (5-26) is printed as:

        "P + Q - 2"

It should be:

        "P + Q - 1"

On page 221 The last term in Eq. (6-1), h(4)x(n-4), should
be deleted making Eq. (6-1) look as follows:

  y(n) = h(0)x(n) + h(1)x(n-1) + h(2)x(n-2) + h(3)x(n-3).

On page 257, the first term in the denominator of
Eq. (6-44) has an exponent of M. It should be a minus M (-M).

On page 269, Figure 6-27: The "zero" should be located
at the origin of the z-plane, and not at point z = 0.7005.

On page 299, there are two "+" to "-" changes in Figure 7-2.
At the top and bottom of the figure, both "i(n) + q(n)"
expressions should be:
                    i(n) - jq(n).

On page 300, two more "+" to "-" changes. On the 7th line
of the 2nd paragraph, and the 9th line of the 3rd paragraph,
both "i(t) + q(t)" expressions should be:
                    i(t) - q(t).

Also on 4th line in the 2nd paragraph, the text "Eq. (7-2)"
should be "Eq. (7-1)".

On page 302, in the last paragraph of this page,
the sentence,

        "If we implement this digital mixing process we'll
         find that the spectral replication period in Figure
         7-3(d) is half what is was in Figure 7-3(c)."

is incorrect and should be deleted from the text.

On page 307, the "6" in the denominator of the first ratio
in Eq. (7-7) should have been a "4". Thus the result of
Eq. (7-7) should be 665 stages. In Figure 7-5(c), those two
diagonal "transition region" lines should not overlap
each other, they should meet on the horizontal axis

at the Freq = 4 kHz point.

On page 334, the second line of equation 8-20 begins with an
equal sign. It should begin with a plus sign.

On page 340, in Section 8.4, 1st paragraph, in the 4th line
down the text:

    "... (N-1)-tap FIR filter ..."

should be

    "... N-tap FIR filter ..."

On page 340, in Section 8.4, 2nd paragraph, in the 5th line
down the text:

    "... b(N) coefficient ..."

should be

    "... b(N-1) coefficient ..."

On page 372, in the middle of the page: it is stated that
"...the value of T bits, all ones, to the right of the
binary point is 1-2^T." It should read:
        "... of the binary point is 1-2^-T."

On page 392, Fig. 10-6: the plots in part (b) should be
relabeled as: "Magnitude of 1, 1, -1, -1" and
"Phase of 1, 1, -1, -1".

On page 394, Figure 10-7: In part (b), the negative spectral
component should be located at an index value of m = -8,
not m = -9.

On page 404, Section 10.2.2, 4th line from bottom
the phrase "work width" should
have been "word width". The same change is necessary on
the top 405.

On page 427, Eq. (10-74): In the right-hand side of the
first line, the conjugation symbol ("*") is missing over
the (e^j2pinm/N) term. It should show: (e^j2pinm/N)^*.

On page 466, on the 4th line above the last paragraph
there is a missing "j" in front of the "e^wt phasor
rotates..." text. It should be "e^jwt phasor rotates...".

On page 467, the text there is so badly written, that
I suggest you completely cross out the bottom five lines
of the text starting with "If we say that the ...".

On page 484, there are four rows of equations at the top
portion of the page. In the second row down from the top
of the page, the third factor over from the left shows:

 .... -(b+a)^2 over 4 = 1 over 3(b+a)....

Change the first "+a" to "-a". It should be:

.... $-\frac{(b-a)^2}{4} = \frac{1}{3}(b+a)$....

The final ratio at the end of Eq. (D-12) is printed as

    "$\frac{(b-a)^2}{4}$".

It should be "$\frac{(b+a)^2}{4}$"

On page 487, in the sentence just following Eq. (E-2), there is a missing
    "P_1/P_2" ratio. That sentence should read as:

      "The logarithmic function $10\log_{10}[P_1/P_2]$,
      plotted in ..."

On page 496, under the "Chebyshev Function": the fifth line
    down is printed as:

        "...ripples in the passband and flat passbands..."

    It should be printed as:

        "...ripples in the passband and a flat stopband..."

On page 499, there are both missing and inappropriate
minus signs.
a. On the next to the last line of the 2nd paragraph,
   (near the middle of the page) there should be a
   minus sign in front of the "0.25 radians/Hz,",
   making it "-0.25 radians/Hz,"
b. That same change should be made on the 1st line of
   last paragraph (i.e., "0.25 radians/Hz," should be
   "-0.25 radians/Hz,").
c. In the middle of Eq. (F-5), the numerator "-0.25"
   should be "0.25" (delete the minus sign).
d. The minus sign at the right side of Eq. (F-5)
   should be deleted making it " = 0.04 seconds".
e. There are two more occurrences of "-0.04 seconds"
   in the text below Eq. (F-5) that should be changed
   to "0.04 seconds" (i.e., delete the minus signs).

On page 505, the year for reference [3] for Appendix F
     (Laakso, et, al) should be 1996 ... *not* 1972.