Corrections and emendations for
Elementary Numerical Analysis, 3rd ed.
by S. D. Conte and Carl de Boor
20feb18

Each item in this list of corrections and emendations is in the form

$a/b/c$: A $\Longrightarrow$ B [C]

to indicate that, at the location specified, A should be replaced by B, with C an optional comment.

The location specification $a/b/c$ means **page** a, **paragraph** or **item** b, and **line** c , with a positive(negative) b or c meaning a count from the top(bottom) of the page or the specified paragraph.

For example, both 5/5/1 and 5/-1/-3 refer to the same line, the one on page 5 that begins "This example was rigged..."

Either A or B can be empty, and [C] rarely occurs. An A of the form A1...A2 indicates the entire text starting with A1 and ending with A2, with ... , if used in B, standing for the entire text between A1 and A2.

v/Chapter 2/1: Polynomial $\Longrightarrow$ Polynomials

1//-10: integral $\Longrightarrow$ integer

13/2/11: such as $\Longrightarrow$ such as the last expression in

19/1/: [better: retain the full number computed but carry along a pointer to the last significant digit]

19/2/5-8: This assumption ... random variables $\Longrightarrow$ This means that we adopt a stochastic model of the propagation of round-off errors in which we treat the local errors as random variables.

23/4/1: has a zero of order $\Longrightarrow$ has a zero of (exact) order

24/-1/: [mention rigorous *a posteriori* error bounds used in existence proofs]

31/1/-2: effective $\Longrightarrow$ effective polynomial

33//-1: auxilliary $\Longrightarrow$ auxiliary

36/4/4: **of** $\Longrightarrow$ of

38/2/-2: at most $\Longrightarrow$ **at most**

38/3/1: at least $\Longrightarrow$ **at least**

41/2/2: $(x - x_1)$ $\Longrightarrow$ $(x - x_0)$

41/2/3: $+$ $\Longrightarrow$ $+(x - x_0)$

43/Figure 2.1/heading: x_1 $\Longrightarrow$ x_i

45//-1: 20 $\Longrightarrow$ 19

50/2.4-2/4: $p_{i+1,j-1}$ $\Longrightarrow$ $p_{i+1,j}$

54/Figure 2.3 legend/2: dotted $\Longrightarrow$ dashed

63/Example/-1: [indent flush with rest of Example]

66//5,6: find then $\Longrightarrow$ then find

66/1/-2,-1: some ... which $\Longrightarrow$ any limit point ξ of the sequence $\xi^{(1)}, \xi^{(2)}, \ldots$, by the continuity of $f^{(n)}(x)$ and any such ξ must lie in $[\lim_r x_0^{(r)}, \lim_r x_n^{(r)}] = [y_0, y_n]$. This

70/flowchart/second-last box:),] $\Longrightarrow$)]

73//3: $15x^5$ $\Longrightarrow$ $15x^4$

79/2/-1: given $\Longrightarrow$ assuming

82//line after label 6: `)  RETURN` $\Longrightarrow$ `) THEN | IFLAG = 0 | RETURN | END IF`

87/Example 3.2b/2: solution ... form $\Longrightarrow$ smallest positive zero of

87/table/: [replace the content of the table by

```
.45000000   1.3279984E+01       .60000000   -1.1262310E+01
.43989500   2.3542378E+00       .66877546    1.2870500E+01
.43721231   1.2177630E-01       .64882229    2.2544956E+00
.43705785   3.7494997E-04       .64361698    1.1312314E-01
.43705737   3.5831818E-09       .64332721    3.2632512E-04
                                .64332637    2.7358738E-09
```

]

105/3/-5: . $\Longrightarrow$ and x by $a + b - x$ (i.e., a rotation of the x, y-plane of 180 degrees around the point $((a + b)/2, 0)$ which leaves the sign of f' unchanged but changes the sign of f'').

110//-6,-5: number of **variations** v $\Longrightarrow$ number v of **variations**

120/title/: MÜLLER $\Longrightarrow$ MULLER [also throughout this section]

122/-2/2: comment cards $\Longrightarrow$ comments

123/fortran program//two lines after label `70`: [will this work if the zero is 0?]

143/2/-2,-1: [proving this claim is a bit tricky]

156/4.2-8/-1: $\Longrightarrow$ (Answers depend crucially on just how rounding is carried out and how substitution is handled, as in `SUBST` or as in Algorithm 4.2. One can get anything, from the correct solution to a singular system.)

159//4: with $\Longrightarrow$ with symmetric

162/4/2: $\mathbf{p}$ $\Longrightarrow$ p

164/-1/4: $\mathbf{A}$, storing the factorization $\Longrightarrow$ A, stored on entry

164/-1/4,5: , and storing $\Longrightarrow$. The program stores the factorization of A in the same workarray $\mathbf{W}$, and stores

164//-5: $\mathbf{A}$ $\Longrightarrow$ A

164//-4 to -1: [delete]

169/4.4-9/5: ℓ_{i1} $\Longrightarrow$ $\ell_{i1} d_{11}$

169/4.4-9/5: $\ell_{i,j-1}$ $\Longrightarrow$ $\ell_{i,j-1} d_{j-1,j-1}$

169/4.4-9/7: ℓ^2_{j1} $\Longrightarrow$ $\ell^2_{j1} d_{11}$

169/4.4-9/7: $\ell^2_{j,j-1}$ $\Longrightarrow$ $\ell^2_{j,j-1} d_{j-1,j-1}$

172/2/4: $p,\ w$ $\Longrightarrow$ p, w

173/2/3: , $\Longrightarrow$

179/Theorem/4: u $\Longrightarrow$ nu

180//-2: u $\Longrightarrow$ ru

181/-2/-4: 50 $\Longrightarrow$ 50a

192/Table/: [the last entry of $B^m z$ and of $z^{(m)}$ for all odd m should be multiplied by -1]

192/2/7: [move the first λ_1 from the numerator to the front of the fraction]

205/1/-5: 11 $\Longrightarrow$ 8

205/2/2,3: p_{i-1} $\Longrightarrow$ p_i [three times]

206/4.8-15/1: matrix $\Longrightarrow$ matrix, i.e., a matrix A satisfying $A = A^H$,

212/-1/2: 2 $\Longrightarrow$ 3

214//2: $s_2 := t_{\max}$ $\Longrightarrow$ $(s_1, s_2, s_3) := (s_2, s_3, t_{\max})$

214/2/6: allright $\Longrightarrow$ alright

215/5.1-1/2: +3 $\Longrightarrow$ $-3(2x_1 + x_2)$

216//-14: $\mathbf{f}'$ $\Longrightarrow$ $\mathbf{f}'(\mathbf{x})$

218//-3: choice $\Longrightarrow$ choices

219/Algorithm/7: $*i$ $\Longrightarrow$ $*\ \ i$

221/3/-6: from $\mathbf{f}$ $\implies$ from $\mathbf{f}'$

231/3/3: positive ... and $\implies$ real symmetric and positive definite, i.e.,

231/4/11: $= (\hat{D} - \omega\hat{U}$ $\implies$ $= ((1-\omega)\hat{D} - \omega\hat{U}$

236/2/-3,-2: will not ... constructing $\implies$ would be wasting time and effort if we were to construct

237/Example 6.2/1: $\pi/4$ $\implies$ $(\pi/4)$

237/Example 6.2/-2: 203 $\implies$ 4065

238/2/: [replace by the following] If, for some $q \in \pi_n$, $\|f-q\|_\infty < \min_i |f(x_i) - p(x_i)|$, then, for all i, $\varepsilon(-1)^i(f(x_i)-p(x_i)) > \|f-q\|_\infty \ge |f(x_i)-q(x_i)| = \varepsilon(-1)^i(f(x_i)-q(x_i))$, therefore $\varepsilon(-1)^i(q-p)(x_i) > 0$ for $i = 0,\dots,n+1$, an impossibility since $q - p \in \pi_n$.

242/2/4:] $\implies$ $,x]$

242//-3: $\prod_{j=0}^{n+1}$ $\implies$ $\prod_{j=0}^{n}$

243/Figure 6.4/: [solid line slightly wrong]

244/(6.19)/: $\ge e^{n/2}$ $\implies$ $= \frac{2^{n+1}}{en\ln n}(1+o(1))$

244/3/-1: . $\implies$; also, see Problem 6.1-15.

245//: $\implies$ **6.1-15** (R.-Q. Jia) Prove that $\|\Lambda_n^u\| \ge 2^n/[4n(n-1)]$ by estimating $\Lambda_n^u(1-1/n)$ from below.

253/Property 3/-1: . $\implies$ and some $\alpha_k \ne 0$.

266/`ORTVAL`/: [the matlab version of this `FORTRAN FUNCTION` was unfortunately omitted from the SIAM reprint but is available in the online file of matlab codes (thank you, Árpád Lukács)]

271/-1/4: continuous $\implies$ monotone [also at 274/4/-1, 276/3/-1, 277//-6]

272//5: $+2\} = i$ $\implies$ $-2\} = -i$

272/(6.51)/: $-ix_n$ $\implies$ $-ix_nj$

274/2/3: 20 $\implies$ 24

275/Example 6.14/2: the relevant quantities are: $\implies$ $c_r = \hat{f}_N(r) = \langle \mathbf{f}, \mathbf{w}^{(r)}\rangle$ with $\mathbf{f} := (f(x_j)), \mathbf{w}^{(r)} := (\mathrm{e}^{\mathrm{i}mx_j}) = (\omega^{mj})$ and

275/Example 6.14/4: These are ... Further $\implies$ Thus $\omega^2 = \omega^{-1} = \overline{\omega}$. Further

275/Example 6.14/-4: Now ... have $\implies$ Therefore,

275/Example 6.14/-2: $-\sqrt{3.4}\omega^{-2}] = \frac{1}{3}3/4$ $\implies$ $-\sqrt{3/4}\omega^{-2}] = \frac{1}{3}\sqrt{3/4}$

281/(6.69)/-2: $x^{\pi-1}$ $\implies$ $x^{P-\pi}$

281/(6.69)/-1:

282/`FFT`/-13: `PRIME(NEXT)` $\implies$ `NOW`

285/`PCUBIC`: [the matlab version of this `FORTRAN FUNCTION` was unfortunately omitted from the SIAM reprint but is available in the online file of matlab codes]

289/2/: [Another possibility is the **not-a-knot** end condition which consists in insisting that also the third derivative be continuous across the interior knot closest to the end, thus making the two polynomial pieces nearest to that end be from the same polynomial.]

289//-5: 79 $\implies$ 81

290/-1/: [The input description is incorrect. The input values C(2,2:N) are ignored; only C(1,:), C(2,1), and C(2,N+1) matter.]

294//1: Chap. 2 $\implies$ Chap.2 and Chap.6

299//2: gets $\implies$ gets from Exercise 2.7-8 that

307//4: $x+b$ $\implies$ $x-b$

311/1/-2: $-$ $\implies$ $+$

311/-2/-5: nonnegative $\implies$ *nonnegative*

312//6: $=$ $\Longrightarrow = -$

313//-8,-4: 6.6 $\Longrightarrow$ 6.3

313//-5: 3 $\Longrightarrow$ 2

313//-4: 2 $\Longrightarrow$ 3

317/Example 7.3/: [the matlab program for the calculations in this example was unfortunately omitted from the SIAM reprint but is available in the online file of matlab codes]

318//1: 8 $\Longrightarrow$ 5

321/(7.50)/: $f_i = \Longrightarrow f_i +$

325/program/statement 4: [delete it]

326/(7.54b)/: 1 $\Longrightarrow b - a$

327/7.4-4/3: 10 $\Longrightarrow$ 4

327/7.4-7/-2: accuracy of $\Longrightarrow$ error in

331/2/10: [if we believe the error estimate, why don't we add it to $\overline{S}$?]

341/-2/-4: $h_k^{2k} \Longrightarrow h^{2k}$

345/7.7-4/3: $h^2 \Longrightarrow h^3$ [twice]

345//-1: $\Longrightarrow$)

346//-3,-2: involving a relation between $\Longrightarrow$ that relates

347/-2/-4: $(_2 \Longrightarrow {}_2$

352//5: $a_{n-1} \Longrightarrow a_{N-1}$

352//6: $(\beta^n \Longrightarrow (\beta^N$

356//3: 8.23 $\Longrightarrow$ * [also on 356/2/3]

359/(8.25)/: $\xi_n \Longrightarrow \eta_n$ [twice; also in 359//-5, 360/(8.26)/, and 360/(8.27)/, since ξ_n is used in quite a different role further down the page]

361/Theorem 8.2/-3: , $\Longrightarrow$, then

362/-1/2,3: [This objection is now moot given that it is well-known now how to differentiate exactly functions given by a program.]

364/3/2: $=$ $\Longrightarrow = -$

365/3/-2: NSTEP $\Longrightarrow$ NSTEPS

366/8.5-1/1: local $\Longrightarrow$ local discretization

367/(8.38)/: $\mathcal{O}(h^{p+1}) \Longrightarrow C_n h^{p+1} + \mathcal{O}(h^{p+2})$ [also at 367/(8.39a)/]

367/(8.38)/+3: $C(x_n + mh) \Longrightarrow C_n$

367/(8.38)/+4: point $\Longrightarrow$ number

367/(8.38)/+5: $x = x_n + mh \Longrightarrow m$

367/(8.39b)/: $\mathcal{O}(h^{p+1}) \Longrightarrow 2C_n h^{p+1} + \mathcal{O}(h^{p+2})$

367/(8.39b)/+3: $C_n(\frac{h}{2})^p \Longrightarrow 2C_n(\frac{h}{2})^{p+1}$

371/2/2: outputted $\Longrightarrow$ output

374/1/6: 8.43 $\Longrightarrow$ 8.44

379/1/6: (8.43) $\Longrightarrow$ (8.44)

381//6,7: and since ... assumption, $\Longrightarrow$

381//9: [delete]

382/8.8-1/-1: $|Ah/2| < 1 \Longrightarrow Ah/2 \neq 1$

382//-7: 10 $\Longrightarrow$ 19

389/1/9: 6 $\Longrightarrow$ 3

393//2: $\beta^2 ... 1 \implies (\beta^2 ... 1)/(-3)$

394//display: $-\frac{1}{2} f_n + \frac{1}{2} f_{n-1} \implies +f_n$

396/2/5: $= h \implies + h$

402/-2/-3: $-1000y \implies -1000x$

402/-1/2: apparently $\implies$

418/(9.21)/: $c_2 x^3 \implies c_3 x^3$

419/9.4-1/: 4 $\implies$ 3

419/9.3-1/-1: $= \implies = 2$

419/9.4-2/: [delete it; it's silly]

423/14./: McCracken ... 1964 $\implies$ Dorn, W. S., and D. McCracken, *Numerical Methods with Fortran IV Case Studies*, John Wiley, New York, 1972.

430//: Lebesque $\implies$ Lebesgue

430//: $\implies$ Matrix: Hermitian, 206

430//: $\implies$ Matrix: Hermitian of a, 142

431//: $\implies$ Polynomial forms: Chebyshev, 258

431//: $\implies$ Polynomial forms: orthogonal, 253ff