**Errata List**
**Numerical Mathematics and Computing, 7th Edition**
**Ward Cheney & David Kincaid**
**Cengage Learning (c) 2012**
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## Chapter 1

- Page 14, **Summary 1.1**, 2nd bullet item, line 4: Change "A segment of" to "The" to read:
  The pseudocode for doing this is:

- Page 20, Computer Exercise 1.1.29, last line of pseudocode: Change **end** to **end for**

- Page 25-26, **Note:** Example 5: The Taylor series $e^x = \sum_{k=0}^{\infty} \frac{x^k}{k!}$ converges for all $x$ with the interval of convergence $(-\infty, \infty)$ from the Ratio Test: $\left| \frac{x^{k+1}}{(k+1)!} \Big/ \frac{x^k}{k!} \right| = \frac{|x|}{(k+1)} \to 0$ as $k \to \infty$.

- Page 26, **Note:** Example 6: The Taylor series $\ln(1+x) = \sum_{k=1}^{\infty} (-1)^{k-1} \frac{x^k}{k}$ convergences for all $-1 < x \le 1$.
  Let $y = 1 + x$. Note that the series $\ln y = \sum_{k=1}^{\infty} (-1)^{k-1} \frac{(y-1)^k}{k}$ converges for all $0 < y \le 2$ from the Ratio Test:
  $\left| \frac{(y-1)^{k+1}}{k+1} \Big/ \frac{(y-1)^k}{k} \right| = |y-1| \frac{k}{k+1} < 1$ when $y = 1$ or $|y-1| < 1$ as $k \to \infty$.

- Page 39, Example 1, second displayed equation: Change exponent from $\pm k$ to $\pm m$ to read:
  $x = \pm(0.1 b_2 b_3)_2 \times 2^{\pm m}$

- Page 40, line 10 reads: $(0.111)_2 \times 2^{-1} = \frac{7}{16}, \qquad (0.111)_2 \times 2^0 = \frac{7}{8}, \qquad (0.111)_2 \times 2^1 = \frac{7}{4}$

- Page 40, Below Figure 1.6, Line 2: Change $(b_2 = 1)$ to $(b_1 = 1)$ to read:
  Now allowing only normalized floating-point numbers $(b_1 = 1)$, we cannot represent

- Page 42, Line 6: Change "Appendix B" to "Appendix C" to read:
  on these subjects are in Appendix C and in the references.)

- Page 44, Example 2, Solution, omit first line in displayed equation to read:
  $[11000010010100001111000000000000]_2 = [\text{C250F000}]_{16}$

- Page 44, Example 2, Solution, omit first line in displayed equation to read:
  $[1100000001001010000111100000 \cdots 0000]_2 = [\text{C04A1E0000000000}]_{16}$

- Page 45, Line -4 above Table, should read and largest finite floating-point numbers in single precision and double precision, respectively.

- Page 45, line 3 of in Table, last entry in line $-3$ should be: $\approx -2^{-1022}$

- Page 47, in Machine Epsilon Pseudocode: Change line 2 to
  **while** $(1.0 + epsi \ge 1.0)$
  Change 4 to
  **end while**

- Page 48, $-9$, should read: then $\varepsilon \approx 2^{-24}$. Sometimes ....

- Page 49, above Example 4, line $-3$: Change $*$ to $\times$:
  $\cdots$ for the operations $\odot = +, -, \times, /$ and

- Page 49, above Example 4, line $-1$: Change $*$ to $\times$:
  for operations $\odot = +, \times$

- Page 56, Insert new sentence after **Significant Digits** to read:

  We first address the elusive concept of **significant digits** or **significant figures** in a number. They are the digits in a decimal number that are warranted by the accuracy of the means of measurement. Suppose $\cdots$

- Page 59, Example 3: Change "how many" to "how much" to read:

  In the subtraction of $y = .6311$ from $x = .6353$, how much significance is lost?

- Page 59, Example 3, Solution, last line: Change "figures" to "digits" to read:

  significant digits in $x$ and $y$. ■

- Page 62, Line 6: Change $e^x - e^{-2x}$ to $e^{3x} - 1$ to read:

  $e^{3x} - 1$ when $x > 0$ and

- Page 62, Line 8: Change $=$ to $\approx$ and change $\leqq$ to $\lessapprox$ to read:

  This inequality is valid when $x \geqq \frac{1}{3}\ln 2 \approx 0.23105$. Similar reasoning when $x < 0$ shows

- Page 62, Line 9: Change $\leqq$ to $\lessapprox$ to read:

  that for $x \lessapprox -0.23105$ and at most 1 bit is lost. Hence, the series should be used for

**Chapter 2**

- Page 76, pseudocode, line 1: Add $, (b_i)_{1:n}$

  **integer** $i, j, n$; **real** *sum*; **real array** $(a_{ij})_{1:n\times 1:n}, (x_i)_{1:n}, (b_i)_{1:n}$

- Page 78, 2nd displayed equation: Change $\dfrac{1}{n}$ to $\dfrac{1}{i}$ on RHS to read:

  $p(1+i) = \cdots = \cdots = \dfrac{1}{i}\left[(1+i)^n - 1\right]$

- Page 79, **Summary 2.1**

  - The **basic elimination** procedure overwrites the following values for $1 \leqq k \leqq n-1$.

- Page 83, Insert before last paragraph:

  Keep in mind that $\varepsilon << 1$ so that $\varepsilon^{-1} >> 1$.

**Chapter 3**

- Page, 143, Line 4, replace "overflow" with "underflow" to read:

  If it is nearly zero, an underflow can occur in Equation (3).

**Chapter 4**

**Chapter 5**

- Page 229, Basic Simpson's Rule

  $$\int_a^{a+2h} f(x)\,dx \approx \frac{h}{3}[f(a) + 4f(a+h) + f(a+2h)]$$

- Page 231, first two displayed equations:

  $$\int_a^b f(x)\,dx = \sum_{i=1}^{n/2} \int_{a+2(i-1)h}^{a+2ih} f(x)\,dx \approx S(f,P)$$

  Using the basic Simpson's rule, we have the right-hand side

  $$S(f,P) = \sum_{i=1}^{n/2} \frac{h}{3} f(a + 2(i-1)h) + 4f(a + (2i-1)h) + f(a + 2ih)]$$

- Page 236, **Remarks**, first paragraph, line 3:

  a high-order Newton-Cotes rule over an entire interval, it is preferable to use a composite

- Page 236, **Remarks**, second paragraph, line 2:

  only used quadrature rules, since they involve fractions that are easy to use in hand

- Page 240, **Change of Intervals**

  Some numerical integration rules, such as Gaussian rules that we discuss in the next subsection, are usually given on an interval such as $[0, 1]$ or $[-1, 1]$.

- Page 240, Bottom of page, omit "Gaussian", to read:

  With the transformation $x = \frac{1}{2}(b-a)t + (a+b)$, a quadrature rule of the form

**Chapter 6**

**Chapter 7**

- Page 302, second displayed equation: Change $x$ to $x'$ in LHS to read:

  $$\int_t^{t+h} x'\,dx = \int_t^{t+h} f(r, x(r))\,dr$$

- Page 304, Theorem 1, line 1: Change $\partial y$ to $\partial x$ to read:

  If $f$ and $\partial f/\partial x$ are continuous $\cdots$

- **Note:** Page 312–331 To be consistent with the ODE system version of Runge-Kutta methods, one could move $h$'s from $K_1$, $K_2$, etc. to the main formula such as $x(t+h) = x(t) + h\big[w_1K_1 + w_2K_2\big]$.

- Page 325, end of second paragraph: Change to read:

  This is a linear system $\mathbf{Ac} = \mathbf{b}$ of equations in $n$ unknowns. The elements of the matrix

  $\mathbf{A} = (A_{ij})$ are $A_{ij} = (1-i)^j$, and the right-hand side $\mathbf{b} = (b_i)$ is $b_i = 1/i$.

- Page 328, **Summary 7.3**, before last bullet item:

  The quantity $\varepsilon = [x(t+h) - \tilde{x}(t+h)|$

- Page 335, bottom displayed equations, use capital letters $\mathbf{X}$ and $\mathbf{K}_1$ and $\mathbf{K}_2$ on RHS:

  where

  $$\begin{cases} \mathbf{K}_1 = \mathbf{F}\,(t, \mathbf{X}) \\ \mathbf{K}_2 = \mathbf{F}\left(t + \frac{1}{2}h, \mathbf{X} + \frac{1}{2}h\mathbf{K}_1\right) \\ \mathbf{K}_3 = \mathbf{F}\left(t + \frac{1}{2}h, \mathbf{X} + \frac{1}{2}h\mathbf{K}_2\right) \\ \mathbf{K}_4 = \mathbf{F}\,(t + h, \mathbf{X} + h\mathbf{K}_3) \end{cases}$$

- Page 342, line 3: Change (12) to (13) to read:

  As an example, the ordinary differential system is Equation (13) can be written

- Page 347, beginning of last paragraph, bottom of page: Change "mulitstep" to "multi-step" to read:

  An example of a multi-step formula is known as the **Adams-Bashforth formular** (see

- Page 353, **Stiff ODEs and an Example**, line 3, omit "the" to read:

  model physical phenomena. $\cdots$

- Page 354, end of first paragraph, replace "increased" with "increases":

  increases. (See Exercise 7.5.2.)

- Page 354, after **Euler's Equation**, line 5, insert "the" to read:

  $\cdots$ For $\mathbf{X}_n$ to converge to 0 for any choice of the initial
- Page 354, line $-4$, bottom of page, omit extraneous "y" to read:

  of the method. In such algorithms, the Jacobian matrix $\partial \mathbf{F}/\partial \mathbf{X}$ may play a role. Solving
- Page 354, line $-2$, insert "or singular" to read:

  efficiency of the code. The Jacobian matrix may be sparse or singular, an indication that the function $\cdots$

**Chapter 8**

- Page 365, Doolittle Factorization Pseudocode: Change **end do** to **end for** (3 times)
- Page 368, 2nd sentence: Change "Equivalently, we have" to "Consequently, we have"
- Page 370, Cholesky Factorization Pseudocode: Change **end do** to **end for** (2 times)
- Page 398, last line in pseudocode: Change **end do** to **end for**
- Page 399, last line in pseudocode: Change **end do** to **end for**
- Page 403, Exercise 2, last line in pseudocode: Change **end do** to **end for**
- Page 444, line $-2$: Change to add $k$-th and make fraction larger

  In general, the $k$-th step is

$$\mathbf{z}_k = \mathbf{v}_k - \sum_{j=1}^{k-1} \operatorname{proj}_{\mathbf{v}_j} \mathbf{v}_k, \qquad \mathbf{q}_k = \frac{\mathbf{z}_k}{||\mathbf{z}_k||}$$

- Page 445, **Example 1**: Change to subscripts to

  Consider the vectors $\mathbf{v}_1 = (1, \varepsilon, 0, 0)$, $\mathbf{v}_2 = (1, 0, \varepsilon, 0)$, and $\mathbf{v}_3 = (1, 0, 0, \varepsilon)$.

- Page 454, top displayed matrices change spacing to:

$$\mathbf{D} = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 2 & 0 \end{bmatrix} \qquad \mathbf{D}^+ = \begin{bmatrix} \frac{1}{5} & 0 \\ 0 & \frac{1}{2} \\ 0 & 0 \end{bmatrix}$$

- Page, top displayed equation: Change spacing to:

$$\mathbf{A} = \begin{bmatrix} -85 & -55 & -115 \\ -35 & 97 & -167 \\ 79 & 56 & 102 \\ 63 & 57 & 69 \\ 45 & -8 & 97.5 \end{bmatrix}$$

**Chapter 9**

- Page 459, line 1 below Introduction: $\cdots$ function into a linear combination of sines and cosines. $\cdots$
- Page 460, Trigonometric Identities (bottom displayed equations):

$$\cos mx \cos nx = \frac{1}{2}\Big[\cos[(m-n)x] + \cos[(m+n)x]\Big]$$

$$\sin mx \sin nx = \frac{1}{2}\Big[\cos[(m-n)x] - \cos[(m+n)x]\Big]$$

$$\sin mx \cos nx = \frac{1}{2}\Big[\sin[(m-n)x) + \sin((m+n)x)\Big]$$

- Page 461, Example 1, Solution, last two line:

$$= \frac{1}{2}\int_{-\pi}^{\pi}\Big[\cos[(m-n)x] - \cos[(m+n)x]\Big]\,dx$$

$$= \frac{1}{2}\Big[\frac{1}{m-n}\sin[(m-n)x] - \frac{1}{m+n}\sin[(m+n)x]\Big]_{-\pi}^{\pi} = 0$$

$$x \approx p_N(x) = 2\sum_{n=1}^{N}(-1)^{n+1}\frac{1}{n}\sin nx \tag{14}$$

$$f(x) = \frac{1}{2L}x \quad \text{on} \quad (0, 2L) \quad \text{with} \quad f(0) = \frac{1}{2} = f(2L)$$

- Page 468, Equation (18):

$$\frac{x}{2L} \approx p_N(x) = \frac{1}{2} - \frac{1}{\pi}\sum_{n=1}^{N}\frac{1}{n}\sin\Big(\frac{n\pi}{L}x\Big) \tag{18}$$

- Page 468, line after subheading **Fourier Series Examples**:

  Here are some common $2L$-periodic Fourier series. (See Figures 9.7–9.9 over $[0, 2\pi]$ with the partial sums using 2, 6, 10, or more terms.)

- Page 471, line $-2$ above the table, make boldface to read:
  An $n$-th root of unity is **primitive**, if it is not a $k$-th root of unity for some smaller $k$: $x^k \neq 1$, for $k = 1, 2, \ldots, n-1$.
- Page 472, second margin note: Change from **Vandermonde Matrix** to **Fourier Matrix** and the sentence below and to the right of it:

  This is known as the **Fourier matrix** of the roots of unity $\omega_n^k$.

- Page 475, line 5, lower limit on integral: Change from $\pi$ to $-\pi$ to read:

$$\langle f, g\rangle = \int_{-\pi}^{\pi} f(x)g(x)\,dx$$

- Page 476, third bullet item, equations for $a_n$ and $b_n$: Change $\frac{1}{P}$ to $\frac{2}{P}$ in both.
- Page 477, at the end of the third bullet item: change **Vandermonde** to **Fourier** so it read:

  which is the **Fourier matrix** of the roots of unity.

- Page 478, Exercise 9.4.5, Exercise 9.4.6, and Exercise 9.4.7: Change or modify to read:

  **5.** For $2L$-periodic functions $f(x) = x^k$ on $[-L, L]$
  $^a$**a.** $k = 1, 3$ $^a$**b.** $k = 2, 4$
  derive the Fourier coefficients and series.
  Then simplify them by letting $L = \pi$.

  **6.** Starting with the Fourier series for a $2\pi$-periodic function $f$ over $[-\pi, \pi]$ and Equations (6)–(9), write out the details for using a change of variables and the substitution rule to convert to the formulas for the Fourier series of periodic functions over:

  **a.** $[-P/2, P/2]$, Equation (15)
  **b.** $[-L, L]$, Equation (16)
  **c.** $[0, 2L]$, Equation (17)
  **d.** $[x_0, x_0 + 2L]$

  **7.** Determine the Fourier series for these $2\pi$-periodic functions:

  **a.** $f(x) = \begin{cases} x/L, & 0 \leqq x \leqq L \\ 2 - x/L, & L \leqq x \leqq 2L \end{cases}$

  **b.** $g(x) = \begin{cases} x + L/2, & -L \leqq x \leqq 0 \\ -x + L/2, & 0 \leqq x \leqq L \end{cases}$

  **c.** $r(x) = \begin{cases} 0, & -\pi \leqq x \leqq 0 \\ \sin x, & 0 \leqq x \leqq \pi \end{cases}$

  $^a$**d.** $s(x) = \begin{cases} -1, & -\pi < x < -\frac{\pi}{2} \\ 0, & -\frac{\pi}{2} < x < \frac{\pi}{2} \\ 1, & \frac{\pi}{2} < x < \pi \end{cases}$

- Page 478, Exercise 9.4.13a:
  **a.** $e^{i2\pi} = 1, \quad e^{i\pi} + 1 = 0$

- Page 478, Exercise 9.4.14:

  **14.** Derive these Fourier series for these $2\pi$-periodic functions over $[-\pi, \pi]$:

  **a.** $x = -2 \displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{1}{n} \sin nx$

  **b.** $x^2 = \dfrac{\pi^2}{3} - 4 \displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{1}{n^2} \cos nx$

  **c.** $x^3 = -2 \displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{1}{n^3} \left(-6 + n^2\pi^2\right) \sin nx$

  Find some interesting infinite series identities.

- Page 478, Exercise 9.4.15: Change to read:

  **15.** Determine the complex conjugate of $\omega_n^k$.

- Page 479, Exercise 9.4.18: Change displayed equation to read:

$$f(x) = \begin{cases} 0, & -\pi < x \leqq 0 \\ x, & 0 \leqq x < \pi \end{cases}$$

- Page 479, Computer Exercise 9.4.2, Computer Exercise 9.4.3, Computer Exercise 9.4.4, and Computer Exercise 9.4.5: Replace or modify with the following:

**Computer Exercises 9.4**

**1.** [Leave as is.]

**d.** This a $n \times n$ normalized unitary matrix

$$\frac{1}{\sqrt{n}} \begin{bmatrix} 1 & 1 & 1 & 1 & \cdot & 1 \\ 1 & \omega & \omega^2 & \omega^3 & \cdots & \omega^{n-1} \\ 1 & \omega^2 & \omega^4 & \omega^6 & \cdots & \omega^{2(n-1)} \\ 1 & \omega^3 & \omega^6 & \omega^9 & \cdots & \omega^{3(n-1)} \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ 1 & \omega^{n-1} & \omega^{2(n-1)} & \omega^{3(n-1)} & \cdots & \omega^{(n-1)^2} \end{bmatrix}$$

where $\omega = e^{i(2\pi/n)} = \cos(2\pi/n) + i\sin(2\pi/n)$ is the **twiddle factor**.

**2.** Use a mathematical software system or a programming language to compute the first eight sets of the $n$-th roots of unity based on the pseudocode

```
for n = 1 to N
  for k = 0 to n − 1
    ω_n^k = e^{i2π(k/n)}
  end for
end for
```

Numerically verify these properties:

**a.** $\omega_n^0 = 1, \quad \omega_n^n = -1$

**b.** $\displaystyle\sum_{k=0}^{n-1} \omega_n^k = 0, \quad (n \geqq 2)$

**c.** $\displaystyle\prod_{k=0}^{n-1} \omega_n^k = (-1)^{n-1}$

**3.** Use mathematical software to compute the Fourier matrices $\mathbf{F}_2$, $\mathbf{F}_4$, and $\mathbf{F}_8$ such as

$$\mathbf{F}_4 = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & i & i^2 & i^3 \\ 1 & i^2 & i^4 & i^6 \\ 1 & i^3 & i^6 & i^9 \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & i & -1 & -i \\ 1 & -1 & 1 & -1 \\ 1 & -i & -1 & -i \end{bmatrix}$$

For these cases, show that $\mathbf{F}_{2^n}$ can be written as a product of $n$ matrices each of which has only two nonzero entries in each row.

**4.** (Continuation) Directly compute

**a.** $\mathbf{F}_4$, $\mathbf{F}_4^{-1}$ and $\mathbf{F}_8$, $\mathbf{F}_8^{-1}$

**b.** $\mathbf{F}_8\mathbf{P}_8 = \begin{bmatrix} \mathbf{F}_4 & \mathbf{D}_4\mathbf{F}_4 \\ \mathbf{F}_4 & -\mathbf{D}_4\mathbf{F}_4 \end{bmatrix}$

where $\mathbf{D}_4 = \text{Diag}(1, \omega, \omega^2, \omega^3)$ and permutation matrix $\mathbf{P}_8$ permutes the columns of $\mathbf{F}_8$ so that the odd-index columns come first.

**5.** Use mathematical software to plot these functions and several of their Fourier series partial sums using a variety of different amplitudes $A$, periods $P = 2L$, and intervals such as $[-\pi, \pi]$, $[-L, L]$, or $[0, 2L]$.

**a.** Sawtooth Wave, Equation (19)

**b.** Square Wave, Equation (20)

**c.** Triangle Wave, Equation (21)

• Page 480, Computer Exercises 9.4.6, Computer Exercises 9.4.7, Computer Exercises 9.4.8, and Computer Exercises 9.4.9: Replace entire page 480 with the following:

**6** (Continuation) Re-do the previous computer exercise using complex Fourier series, which may have an advantage in some situations.

**7.** Consider these periodic functions

**a.** $f(x) = 2 + x, \qquad x \in (-2, 2)$

[a]**b.** $g(x) = x(x+1), \quad x \in (-\pi, \pi)$

**c.** $s(x) = \left|\sin \dfrac{x}{2}\right|, \quad x \in (-\pi, \pi)$

**d.** $r(x) = \frac{1}{2}(\pi - x), \quad x \in (0, 2\pi)$

**e.** $h(x) = \begin{cases} \pi + x, & x \in (-\pi, 0) \\ \pi - x, & x \in (0, \pi) \end{cases}$

Use mathematical software to symbolically compute the Fourier series partial sums with 2, 6, 10, or more terms. Plot the function and the partial sums. Compare the results with using any available built-in Fourier series routines.

**8.** Consider the $2\pi$-periodic functions $x^k$ over $[-\pi, \pi]$

**a.** $k = 1$ **c.** $k = 3$

**b.** $k = 2$ [a]**d.** $k = 4$

Use mathematical software to symbolically compute the Fourier series partial sums, in simplified form. Plot the function and the partial sums with 2, 6, 10, or more terms. Find some infinite series identities such as $\dfrac{\pi^4}{90} = \displaystyle\sum_{n=1}^{\infty} \frac{1}{n^4}$.

**9.** Consider these periodic functions

**a.** $f(x) = e^{x/\pi}, \qquad x \in [-\pi, \pi]$

**b.** $g(x) = \sin x, \quad x \in [-\pi, \pi]$

**c.** $h(x) = \begin{cases} 0, & x \in [-\pi, -\frac{\pi}{2}) \\ 1, & x \in (-\frac{\pi}{2}, \frac{\pi}{2}) \\ 0, & x \in (\frac{\pi}{2}, \pi] \end{cases}$

**d.** $r(x) = \cosh(x - \pi), \quad x \in [-2\pi, 0]$
(periodic extension)
(even periodic extension)
(odd periodic extension)

Use mathematical software to symbolically compute the complex Fourier coefficients and their partial sums, with 2, 6, 10, or more terms, as well as plotting them. Compare the results to using any available built-in Fourier series functions or procedures.

**10.** Consider the $2\pi$-periodic function $f(x) = x^2$ over $[-1, 1]$. Use symbolic mathematical software to compute the complex Fourier series. Establish some infinite series identities such as $\dfrac{\pi^2}{6} = \displaystyle\sum_{n=1}^{\infty} \frac{1}{n^2}$

*Hint:* The **Parseval's Identity** may be useful

$$\sum_{n=-\infty}^{\infty} |c_n|^2 = \frac{1}{2\pi} \int_{-\pi}^{\pi} |f(x)|^2 \, dx$$

## Chapter 10

## Chapter 11

- Page 516, pseudocode, line −12: Change **end** to **end for**

## Chapter 12

- Page 550, pseudocode **real function** Norm, lines 4–8:
  2nd for-statement and double indent $t \leftarrow t + u_{ij}^2$ to read:

  $\vdots$

  **for** $i = 1$ **to** $n_x - 1$
      **for** $j = 1$ **to** $n_y - 1$
          $t \leftarrow t + u_{ij}^2$
      **end for**
  **end for**

  $\vdots$

## Chapter 13

## Chapter 14

## Answers

- Page 641, Replace answers to Exercise 2.1.7a and Exercise 2.1.7b:

  **Exercises 2.1**

  $\vdots$

  **7a.** $\begin{cases} x_1 = \phantom{-}1.6034 + 0.4165i \\ x_2 = -0.4793 - 1.5664i \\ x_3 = \phantom{-}3.2039 + 1.2425i \end{cases}$

  **7b.** $\begin{cases} x_1 = \phantom{-}1.7915 + 0.1034i \\ x_2 = \phantom{-}1.2743 - 0.9389i \\ x_3 = -1.0544 - 3.517i \end{cases}$

- Page 645, Modify answers to Exercises 5.1.2:

  **Exercises 5.1**

  $\vdots$

  **22.** $\big|\text{Error Term}\big| \leqq 0.3104$

- Page 646, Modify answers to Exercise 5.4.13 and Exercise 6.2.7a:

  **Exercises 5.4**

  $\vdots$

  **13.** $A = \dfrac{h}{3}, \quad B = \dfrac{4}{3}h, \quad C = \dfrac{h}{3}, \quad D = 0$

  $\vdots$

  **Exercises 6.2**

**7a.** $S(x)$ is not continuous at $x = -1$,
$S''(x)$ is not continuous at $x = -1, 1$

$\vdots$

**8b.** Should be $n + 1$

**8c.** Should be $m(n - 1)$

- Page 647, Modify the answer to Exercise 6.3.2

**Exercises 6.3**

**2.** Chebyshev polynomials recurrence relation.
See Section 9.2, page 436.

$\vdots$

- Page 650, Make $\boldsymbol{\chi}$ boldface in both answers to Exercise 8.1.16a(also alignement of 2nd column) and Exercise 8.1.16b to match those on page 377.

**Exercises 8.1**

$\vdots$

**16a.** $\boldsymbol{\chi}^{-1} = \begin{bmatrix} 1 & 0 & 0 & -1 \\ 1 & 1 & -1 & -1 \\ -1 & 0 & 1 & -1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

**16b.** $\boldsymbol{\chi}^{-1} = \begin{bmatrix} 0 & -1 & -1 & 1 \\ -1 & 0 & -1 & 1 \\ -1 & -1 & 0 & 1 \\ 1 & 1 & 1 & -1 \end{bmatrix}$

- Page 651, Add to second line in answer for Computer Exercise 8.2.11 to read:

**Computer Exercise 8.2**

$\vdots$

**11.** Eigenvalues/Eigenvectors: $1, (-1, 1, 0, 0)$; $2, (0, 0, -1, 1)$;
$5, (-1, 1, 2, 2)$; $10, (2, 2, 1, 1)$

- Page 651, Modify the answer to Exercise 9.2 to read:

**Exercises 9.2**

$\vdots$

**5.** By Exercise 9.2.4, the recurrence relation is the
same as (2): $T_n(x) = f_n(x) = \cos(n \arccos x)$

- Page 652, Replace answers to Exercise 9.4.5 and Exercise 9.4.7d with the following:

**Exercises 9.4**

**5a.** $x$: $b_n = -(-1)^n \dfrac{2L}{n\pi}$ **5b.** $x^2$: $\begin{cases} \dfrac{1}{2} a_0 = \dfrac{1}{3} L^2 \\ a_n = (-1)^n \dfrac{4L}{n^2\pi^2} \end{cases}$

**7d.** $s(x) = \dfrac{2}{\pi} \displaystyle\sum_{n=1}^{\infty} \left[\cos \frac{n\pi}{2} - \cos n\pi\right] \sin n\pi$

- Page 652, Replace answers to Computer Exercise 9.4.6 and Computer Exercise 9.4.8a with the following:

  **Computer Exercises 9.4**

  **7b.** $x(x+1) = \dfrac{\pi^3}{3} + \sum_{n=1}^{\infty}(-1)^n \left[\dfrac{4}{n^2}\cos nx - \dfrac{2}{n}\sin nx\right]$

  **8d.** $x^4 = \dfrac{\pi^4}{5} + 8\sum_{n=1}^{\infty}(-1)^n \dfrac{1}{n^4}\left(-6 + n^2\pi^2\right)\cos nx$

- Page 653, Move the table in Answer for Computer Exercise 11.1.1 to be the Answer for Computer Exercise 11.2.1 and insert the following as the new Answer for Computer Exercise 11.1.1:

  **Computer Exercises 11.1**

  **1.** General solution: $x(t) = \ln(8\pi^2) - 2\ln(\cos 2\pi t)$

  **Exercises 11.2**

  ⋮

  **Computer Exercises 11.2**

  **1.** (table from old answer to Computer Exercise 11.1.1)

  **2a.** $x = 1/(1+t)$ **2b.** $x = \log(1+t)$

**Appendix**

**Bibliography**

**Inside front covers**

**Inside back covers**

**Errata: Student Solutions Manual for Numerical Mathematics and Computing**, 7th Edition, Ward Cheney & David Kincaid, Brooks/Cole: Engage Learning (c) 2012

**Errata: Instructor Solutions Manual for Numerical Mathematics and Computing**, 7th Edition, Ward Cheney & David Kincaid, Brooks/Cole: Engage Learning (c) 2012

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