

Errata for First Printing of
Numerical Methods with MATLAB:
Implementations and Applications

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This document lists only the technical errors in the mathematics or in the prose. Typographical errors in spelling and punctuation are not included. Some changes to the prose to clarify a technical concept are noted. The errors noted here occurred in the *first printing* in August 2000.

Chapter 2: Interactive Computing in MATLAB

page 36

At about the middle of the page the expression `>> x = (end-3,end) = [\,]` should be

```
x(end-3,end) = []
```

page 78, Exercise 11

Replace references to the x and y vectors with u and v , respectively. The last line of the problem statement should read:

... create the 2×3 matrix A having u as its first row vector and v as its second row vector.

page 79, Exercise 15

`flipr1` should be `fliplr`.

page 80, Exercise 20

Element $D_{2,2}$ should be $(1 - 1)$, not $(1 + 1)$.

page 81, Exercise 28

The tabulated data for viscosity of water are inconsistent with the contents of `H2Ovisc.dat`. The data in `H2Ovisc.dat` are correct. The table should read

T °C	μ_{air} kg/(m·s)	T °C	$\mu_{\text{H}_2\text{O}}$ kg/(m·s)
0	1.720×10^{-5}	0	1.787×10^{-3}
20	1.817×10^{-5}	5	1.519×10^{-4}
40	1.911×10^{-5}	10	1.307×10^{-4}
60	2.002×10^{-5}	20	1.002×10^{-4}
80	2.091×10^{-5}	30	7.975×10^{-4}
100	2.177×10^{-5}	40	6.529×10^{-4}
127	2.294×10^{-5}	50	5.468×10^{-4}
177	2.493×10^{-5}	60	4.665×10^{-4}
227	2.701×10^{-5}	70	4.042×10^{-4}
		80	3.547×10^{-4}
		90	3.147×10^{-4}
		100	2.818×10^{-4}

Chapter 3: MATLAB Programming

page 92, Caption of Listing 3.3

Change “diary” to “script” so that the caption reads:

Script for plotting data created by editing the script file created in Example 3.3.

page 140–141, Exercise 8

In part (b) (on page 141) change 1935 to 1936. The day before Elvis’s first birthday is January 7, 1936.

page 145, Exercise 24

On the third line of page 145, the formula for x_{\max} should be $x_{\max} = L - \sqrt{b(b+2a)/3}$. The closing parenthesis should immediately follow a , not 3.

page 145, Exercise 27

Replace “xy4.dat” with “xy5.dat”. The xy4.dat file is not in the NMM Toolbox.

page 148, Exercise 43

In the last line of the problem statement a factor of 10^{-3} is missing from the value of k . The correct value of k is

$$k = 26.3 \times 10^{-3} \text{ W/(m}^\circ\text{C)}$$

page 148, Exercise 44

The first `end` statement is on line 30, not line 33.

pages 149–150, Exercise 47

This Exercise contains four errors:

1. In the third line, “pressure” is misspelled: replace “pressuce” with “pressure”.
2. The upper limit for the sums should be $n + 1$, not n .
3. the lower limit of the sum for μ should be $i = 1$, not $i - 1$.
4. In the table on page 150, the coefficient $c_{\mu,4}$ has an extraneous letter “e” in the mantissa.

A complete and corrected version of Exercise 3-47 is given on the following page.

Corrected Version of Exercise 3-47:

47. (3) Using the `H2Odensity` function in Listing 3.12 as a guide, construct an `airProps` function that returns values for the density (ρ), viscosity (μ), specific heat at constant pressure (c_p), and thermal conductivity (k), of air as a function of temperature and pressure. The function definition statement should be

```
function [rho,cp,mu,k] = airProps(T,p,units)
```

Where `T` is the temperature, `p` is the pressure, and `units` is a string indicating the system of units. Values for `T`, `p`, and `units` should be optional. Your function should be callable in the following ways:

```
[rho,cp,mu,k] = airProps
[rho,cp,mu,k] = airProps(T)
[rho,cp,mu,k] = airProps(T,p)
[rho,cp,mu,k] = airProps(T,p,units)
```

with reasonable default values for `T`, `p`, and `units` provided. Use the following equations to compute the density and the thermophysical properties:

$$\rho = \frac{p}{RT} \quad c_p = \sum_{i=1}^{n+1} c_{cp,i} T^{n-i+1}$$

$$\mu = \sum_{i=1}^{n+1} c_{\mu,i} T^{n-i+1} \quad k = \sum_{i=1}^{n+1} c_{k,i} T^{n-i+1}$$

where p is the absolute pressure of the air, $R = 287.0$ J/kg/K is the ideal gas constant for air, T is the *absolute* temperature in kelvins ($T(K) = 273.15 + T(^{\circ}\text{C})$), and $c_{cp,i}$, $c_{\mu,i}$, and $c_{k,i}$ are constants in the following table

i	$c_{cp,i}$	$c_{\mu,i}$	$c_{k,i}$
1	$-2.455322455 \times 10^{-7}$	$2.156954157 \times 10^{-14}$	$-2.486402486 \times 10^{-12}$
2	$6.701631702 \times 10^{-4}$	$-5.332634033 \times 10^{-11}$	$-2.871794872 \times 10^{-8}$
3	$-2.992579643 \times 10^{-1}$	$7.477905983 \times 10^{-8}$	$9.629059829 \times 10^{-5}$
4	1.042503030×10^3	$2.527878788 \times 10^{-7}$	$2.060606061 \times 10^{-5}$

These polynomial curve fit coefficients were obtained from data in the range $100 \leq T \leq 600\text{K}$. Make sure you check that the input value of T lies in this range. Note that n is the degree of the polynomial, and that there are $n + 1$ coefficients for each property in the preceding table.

Chapter 4: Organizing and Debugging MATLAB Programs

page 160, Equation (4.1)

The upper limit of the integral is $t_i + 23$, *not* $t_i + 24$. The implementation in `dailyAve` is correct.

page 160, Equation (4.2)

The upper limit of the integral is $t_i + 166$, *not* $t_i + 167$. The implementation in `weeklyAve` is correct.

page 175, Listing 4.4

Line numbers are critical for this listing. The proper appearance of the line numbers is shown on the following page.

```

1 function rho = H20density(T,units)
2 % H20density Density of saturated liquid water
3 %
4 % Synopsis: rho = H20density
5 %           rho = H20density(T)
6 %           rho = H20density(T,units)
7 %
8 % Input: T = (optional) temperature at which density is evaluated
9 %         Default: T = 20C. If units='F', then T is degrees F
10 %       units = (optional) units for input temperature, Default = 'C'
11 %            units = 'C' for Celsius, units = 'F' for Fahrenheit
12 %
13 % Output: rho = density, kg/m^3 if units = 'C', or lbm/ft^3 if units = 'F'
14
15 % Notes: Use 4th order polynomial curve fit of data in Table B.2
16 %        (Appendix B) of "Fundamentals of Fluid Mechanics",
17 %        B. R. Munson, et al., 2nd edition, 1994, Wiley and Sons, NY
18
19 if nargin<1
20 rho = 998.2; return; % Density at 20 C w/out evaluating curve fit
21 elseif nargin==1
22 units='C'; % Default units are C
23 end
24
25 % --- Convert to degrees C if necessary
26 if upper(units)=='F'
27 Tin = (T-32)*5/9; % Convert F to C; don't change input variable
28 elseif upper(units) == 'C'
29 Tin = T;
30 else
31 error(sprintf('units = ''%s'' not allowed in H20density',units));
32 end
33
34 % --- Make sure temperature is within range of curve fit
35 if Tin<0 | Tin>100
36 error(sprintf('T = %f (C) is out of range for density curve fits',Tin));
37 end
38
39 % --- Curve fit coefficients
40 c = [ 1.543908249780381441e-05 -5.878005395030049852e-03 ...
41      1.788447211945859774e-02 1.000009926781338436e+03];
42
43 rho = polyval(c,Tin); % Evaluate polynomial curve fit
44 if upper(units)=='F'
45 rho = rho*6.243e-2; % Convert kg/m^3 to lbm/ft^3
46 end

```

Chapter 5: Unavoidable Errors in Computing

page 194

In the second-to-last sentence before the display of the 64 bit number, insert “including a sign bit” *in two places*. Insert a comma after the first instance of “including a sign bit”. The corrected sentence reads:

A 64-bit (double-precision) floating-point number uses 53 bits for the mantissa including a sign bit, and 11 bits for the exponent including a sign bit.

page 194

In the display of the 64 bit value, change “53 bit mantissa” to “52 bit value of mantissa”. The corrected display looks like:

$$\overbrace{\underbrace{b}_{\text{sign}} \underbrace{bb \dots bb}_{52 \text{ bit value of mantissa}} \underbrace{bbbbbbbbbb}_{11 \text{ bit exponent, including sign}}}_{64 \text{ bits}}$$

page 197

In the last line of the page, change $\sum_{j=1}^k b_k 2^{-k}$ to $\sum_{j=1}^k b_j 2^{-j}$, i.e., replace k inside the sum with j .

page 198

In the displayed equation at the top of the page, change $\sum_{j=1}^k b_k 2^{-k}$ to $\sum_{j=1}^k b_j 2^{-j}$, i.e., replace k inside the sum with j .

page 198, Algorithm 5.1

Two Errors: The power of 2 in the third line of the algorithm should be $-k$ not k . The correct line is

$$\text{if } r_{k-1} \geq 2^{-k}$$

Inside the **else** block, the line $r_k = r_{k-1}$ is missing. The correct version of the algorithm is

Algorithm 5.1 Conversion from Floating-Point to Binary

```

r0 = x
for k = 1, 2, . . . , m
  if rk-1 ≥ 2-k
    bk = 1
    rk = rk-1 - 2-k
  else
    bk = 0
    rk = rk-1
  end if
end for

```

page 204

In the displayed equation at the bottom of the page, the value of x_1 has an extra “2” as the fourth digit. The correct value of x_1 (to eleven digits) is

$$x_1 = 54.318158995$$

page 205–206, Equations (5.5), (5.6) and below

In the denominators of last terms in both Equation (5.5) and Equation (5.6), the discriminant should be $b^2 - 4ac$, not $b^2 + 4ac$. Equations (5.5) and (5.6) should look like

$$x_1 = \dots = \frac{2c}{-b - \sqrt{b^2 - 4ac}}, \quad (5.5)$$

$$x_2 = \dots = \frac{2c}{-b + \sqrt{b^2 - 4ac}} \quad (5.6)$$

This typographical error is also present in the expression for $x_{2,4}$ at the bottom of page 205, and the expression for $x_{1,4}$ at the top of page 206. The corrected formulas for $x_{2,4}$ and $x_{1,4}$ should look like

$$x_{2,4} = \frac{2c}{-b + \sqrt{b^2 - 4ac}} \dots$$

$$x_{1,4} = \frac{2c}{-b - \sqrt{b^2 - 4ac}} \dots$$

In all, the plus sign should be changed to a minus sign in four places, once in each equation.

page 218

The displayed equation for T_k is missing a minus sign on the right hand side. The correct equation is

$$T_k = -\frac{x^2}{k(k-1)}T_{k-2}.$$

The code in `sinser` is correct.

page 222, Equation (5.21)

The last term on the right hand side should be $(x - x_0)^3/(1 - x_0)^4$. The correct version of Equation (5.21) is

$$P_3(x) = \frac{1}{1-x_0} + \frac{x-x_0}{(1-x_0)^2} + \frac{(x-x_0)^2}{(1-x_0)^3} + \frac{(x-x_0)^3}{(1-x_0)^4}, \quad (5.21)$$

page 226

In Equation (5.24) and in the last sentence of the paragraph preceding Equation (5.24), change $E(h, x)$ to $E(x, h)$.

page 228

In the displayed equation at the bottom of the page, pi should be π . The correct equation is

$$E(d, n) = d \left(n \sin \frac{\pi}{n} - \pi \right).$$

page 232

In the middle of the second paragraph of § 5.4, change “ $x\varepsilon_m$ ” to “ $|x|\varepsilon_m$ ” so that the sentence reads:

The distance between the floating-point value x and its nearest neighbor is $|x|\varepsilon_m, \dots$

page 235, Exercise 15

At the end of the first line, change $x = \text{logspace}(-12, 12, 100)$ to $x = \text{logspace}(-12, 2, 100)$. In other words, the second argument to `logspace` becomes 2 instead of 12.

page 238, Exercise 26

The formula for γ_n is missing $1/3$ as the third term in the series. The correct formula for γ_n is

$$\gamma_n = \left[1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{n} - \ln n \right].$$

Chapter 6: Finding the Roots of $f(x) = 0$

pages 245-246

Algorithm 6.1 was garbled in the final revisions before printing. To fix it, replace all instances of x_a with a , and all instances of x_b with b . The correct version of the algorithm is

Algorithm 6.1 Bracketing

```

given:  $f(x)$ ,  $x_{\min}$ ,  $x_{\max}$ ,  $n$ 

 $dx = (x_{\max} - x_{\min})/n$       (size of bracket interval)
 $a = x_{\min}$                     (initialize left side of test bracket)
 $i = 0$                         (initialize counter)

while  $i < n$ 
   $i \leftarrow i + 1$ 
   $b = a + dx$ 
  if  $f(x)$  changes sign in  $[a, b]$ 
    save  $[a, b]$  for further root-finding
  end
   $a = b$ 
end

```

pages 246

In the first line of text immediately following the Bracketing algorithm, replace $[x_{\min}, x_{\max}]$ with $[a, b]$ so that the line reads:

The test “if $f(x)$ changes sign in $[a, b]$ ” requires further elaboration.

pages 252

In the second-to-last line of tabular output on the page (in row $n = 9$), the value in the x_1 column should be 21.2211516518. There is a missing “2” as the first digit.

page 253

In the displayed equation in §6.2.1, the convergence criteria for fixed point iteration should read

$$|g'(x)| < 1, \quad \text{and} \quad a \leq g(x) \leq b, \quad \text{for all } x : a \leq x \leq b.$$

page 254, Algorithm 6.3

In the fourth line of the algorithm, the test should be

$$\text{if } \text{sign}(f(x_m)) = \text{sign}(f(a))$$

i.e., replace $f(x_a)$ with $f(a)$.

page 257

There is a minus sign missing from the right hand side of equation immediately under Table 6.1. The equation should read

$$n = -\log_2 \left(\frac{\delta_n}{\delta_0} \right)$$

page 261, Equation (6.11)

In the last term on the right hand side, $(\Delta x)^2$ should be $\frac{(\Delta x)^2}{2}$.

page 272

The displayed equation for Δx near the middle of the page is missing a minus sign on the right hand side. The correct equation is

$$\Delta x = -f(x_k) \frac{x_k - x_{k-1}}{f(x_k) - f(x_{k-1})}.$$

page 273

At the end of the first paragraph of § 6.6, the references are incorrect. The correct version of the last sentence is

For a discussion of programs in Fortran and C that use these hybrid methods, see [43, 61].

page 281

The order of the c_i in Equation (6.15) are reversed. The correct form of the equation is

$$c_1\lambda^4 + c_2\lambda^3 + c_3\lambda^2 + c_4\lambda + c_5 = 0. \quad (6.15)$$

page 282

In the third-from-the-last line of text on the page, change “ h^2 ” to h . The sentence should end

... the coefficient of the h term must appear as a zero.

page 284, Exercise 1

The formula for $\cos \theta$ is incorrect. The correct formula is

$$\cos \theta = \frac{1}{(h^2 + w^2)} \left(-bh + \sqrt{b^2h^2 + (h^2 + w^2)(w^2 - b^2)} \right).$$

page 285, Exercise 7

$|g'(x) < 1|$ should be $|g'(x)| < 1$.

page 286, Exercise 14

In the third line, the stopping criterion should be $|f(x)| < 5 \times 10^{-10}$, not $f(x) < 5 \times 10^{-10}$.

page 290, Exercise 32

The generally accepted criteria for the transition from laminar to turbulent flow is $Re = 2000$. The f formula for laminar flow applies to $Re \leq 2000$. Also change the values of Re in part (c) and part (d) to 2001 (instead of 3001).

Chapter 7: A Review of Linear Algebra

page 315, Algorithm 7.1

The statement “initialize $b = \text{zeros}(n, 1)$ ” should be “initialize $b = \text{zeros}(m, 1)$ ”

page 318, Algorithm 7.2

The statement “initialize $b = \text{zeros}(n, 1)$ ” should be “initialize $b = \text{zeros}(m, 1)$ ”

page 327, Algorithm 7.5

The order of the loop indices (i and j only) are reversed (n and m are OK). The correct form of the second and third line of the algorithm is

```
for j = 1, ..., n
  for i = 1, ..., m
```

page 353

In the MATLAB commands in the middle of the page. Replace the line

```
>> p = [2 5 3 1 4]; % p must have same number of rows as A
```

with

```
>> p = [2 5 3 1 4]'; % length(p) must equal number of rows in A
```

The *essential* change is the addition of an apostrophe after the closing bracket before the semicolon. The MATLAB statements in the text will work because MATLAB interprets the p in $A(p, :)$ as a column vector regardless of how p is defined. Defining p as a row vector is potentially confusing, however. The comment statement makes the situation worse because $p = [2 5 3 1 4]$ creates a vector with just one row, which is not the number of rows in A .

page 355

Strike “sparse” in the second line of text on the page (after the tables).

page 358, Exercise 7

Part (b) (only) should read

Column scaling: $B = AD, \dots$

page 359, Exercise 16, two errors

On the first line, the recommended name of the m-file function should be `vecMatRow` not `vecMatCol`.

On the third line, “Algorithm 7.2” should be “Algorithm 7.3” so that the second sentence reads

... replacing the inner loop of Algorithm 7.3...

page 360, Exercise 19

At the end of the last sentence, replace γ with ζ .

page 361, Exercise 29

c should also be a column vector, i.e, add a transpose operator so that text in the first lines reads:

... where $a = (1, 0, 0)^T$, $b = (0, 1, 0)^T$, $c = (0, 0, 1)^T$, and $d = 2a + b$,
...

page 362, Exercise 39, part (b)

The u vectors should all be column vectors. There is a transpose missing from each of the u vectors. The first line of part (b) should begin:

for $\theta = \pi/4$ and $u = [1, 0]^T$, $u = [1, 1]^T$, and $u = [0, 1]^T$, compute
...

Chapter 8: Solving Systems of Equations

page 372

In the text preceding the last displayed equation on the page, change \bar{x} to \hat{x} . The last two sentences before the displayed equation should read

Assume that \tilde{x} and \hat{x} are two solutions to $Ax = b$. Subtracting $A\hat{x} = b$ from $A\tilde{x} = b$ gives

page 394, Algorithm 8.5

Replace the fourth line of the algorithm with

find i_p such that $|\tilde{a}_{i_p,i}| = \max(|\tilde{a}_{ki}|)$ for $k = i \dots n$

page 405

The value of δ specified in the second line of text is inconsistent with the value of the first element of `bp` in the MATLAB example. Change $\delta = 0.01$ to $\delta = 0.001$. In other words, the second equation on the page should read

Consider $b' = [1 + \delta, 2]^T$ where $\delta = 0.001$.

page 407

Insert “with pivoting” after “elimination” in the second rule of thumb at the bottom of the page (inside the box). The second rule of thumb should read

...the numerical solution to $Ax = b$ by any variant of Gaussian elimination with pivoting is correct to d digits, ...

page 411

The displayed equation in the middle of the page should read

$$Ux = y$$

i.e., replace b with y .

page 412

In the last two displayed equations on the page, change $j = 1, \dots, n$ to $k = i + 1, \dots, n; j = i, \dots, n$. In Equation (8.41), change m_{ki} to m_{kj} .

Chapter 9: Least Squares Fitting of a Curve to Data

page 465

At the end of the first line of text below Equation (9.16), the $\|r\|_2$ term should be squared. The second in-line equation should be

$$\|r\|_2^2 = \sum_{i=1}^m (y_i - \hat{y}_i)^2$$

page 476

Two thirds down the page, the displayed equation $y_f = A_f x_f$ should be $y_f = A_f c$.

page 479

In the middle of the page, the demonstration of `fitnorm` is potentially misleading. The second return argument is `r`, which is used for the residual in the preceding paragraphs. If the user wishes to have `fitnorm` return the residual vector the call to `fitnorm` should be:

```
>> [c,R2,r] = fitnorm(x,y,'xinvpxBasis');
```

or, if the value of `R2` is not needed,

```
>> c = fitnorm(x,y,Afun);
```

page 479

Near the bottom of the page, the demonstration of `fitnorm` with an in-line function object is potentially misleading. The second return argument is `r`, which is used for the residual in the preceding paragraphs. If the user wishes to have `fitnorm` return the residual vector the call to `fitnorm` should be:

```
>> [c,R2,r] = fitnorm(x,y,Afun);
```

or, if the value of `R2` is not needed,

```
>> c = fitnorm(x,y,Afun);
```

page 488

Two thirds down the page, a sentence begins “If $\text{rank}(A) = r < n$, then only the first r columns ...”. The use of r to designate the rank of A is confusing since r is also used as the residual vector. Change the lower case r to k (in two places) so that the sentence reads

If $\text{rank}(A) = k < n$, then only the first k columns ...

page 488

In the third line from the bottom of the page, change m to n , and insert a comma after “ Q ” so that the sentence reads

If \tilde{Q} is the matrix composed of the first n columns of Q , and ...

page 496

Midway down the page, two ways of calling the `polyval` function are demonstrated. The second line calls `polyfit` instead of `polyval`. The second line should be:

```
[yf,dy] = polyval(p,xf,S)
```

page 497

In the displayed equation one third down the page, the order of terms on the right hand side are reversed. This equation should be:

$$r_i = T_i - T_{\text{fit},i}$$

page 497

The equation at the right end of the second-to-last line on the page should be $r_i = T_i - T_{\text{fit},i}$

page 513, Exercise 11

The correct form of the transformed linear relationship is $z = c_1 + c_2w$.

Chapter 10: Interpolation

page 523, Example 10.1

In the seventh line of text from the top of the page, change 3:54 to 2:54.

page 528, Equation (10.4)

The exponent of the second term on the right hand side should be $n - 2$, not $n - 1$.

page 528, Equation (10.6)

The element in row 3, column 1 of the matrix should be 4, not 2.

page 529, Example 10.4

The price for 1986 should be 133.5, not 113.5.

page 530

In third line of the paragraph preceding Equation (10.8) is a reference to Equation (8.38). Equation (8.38) is on page 407, not page 363.

page 538

In the equation for $P_n(x)$, the last term contains an extraneous factor of $(x - x_{n+1})$. The correct definition of $P_n(x)$ is

$$P_n(x) = c_1 + c_2(x - x_1) + c_3(x - x_1)(x - x_2) + \cdots \\ + c_{n+1}(x - x_1)(x - x_2) \cdots (x - x_n),$$

page 540

Replace the fourth equation from the bottom of the page, and the text preceding it and following it with

where, after some algebra we get

$$\frac{f[x_1, x_3] - f[x_1, x_2]}{x_3 - x_2} = \frac{f[x_2, x_3] - f[x_1, x_2]}{x_3 - x_1} \equiv f[x_1, x_2, x_3]$$

and $f[x_1, x_2, x_3]$ is the second-order divided difference...

page 545, Example 10.8

Two thirds down the page, after “The fourth and fifth columns are filled in with”, the displayed equations for the third order and fourth order divided differences contain errors. The denominators of both terms are reversed (they have the wrong sign), and the arguments of the divided differences in the numerator are in the wrong order. The correct versions of these equations are

$$f[V_{i-2}, V_{i-1}, V_i] = \frac{f[V_{i-1}, V_i] - f[V_{i-2}, V_{i-1}]}{V_i - V_{i-2}}$$

and

$$f[V_{i-3}, V_{i-2}, V_{i-1}, V_i] = \frac{f[V_{i-2}, V_{i-1}, V_i] - f[V_{i-3}, V_{i-2}, V_{i-1}]}{V_i - V_{i-3}},$$

page 562

In Equation 10.35, the x on the left hand side should be \hat{x} . In other words the left hand side of the equation is $P_i(\hat{x}) =$.

page 563

In Equation 10.36, the x on the left hand side should be \hat{x} . In other words the left hand side of the equation is $P_i(\hat{x}) =$.

page 583, Figure 10.19

The legend in each of the subplots is incorrect. The solid line is $x \exp(-x)$ and the dashed line is the spline plot. The correct plot is created with the `compSplinePlot` function in version 1.04 of the NMM toolbox.

Chapter 11: Numerical Integration

page 599, Example 11.1

The the upper limit of the integral is $\pi/2$ (not 2π), the width of the sheet is $L = 2aE$ (not $4aE$), and the parameter of the elliptic integral is $k^2 = 1 - b^2/a^2$ (not $k = 1 - b^2/a^2$).

page 603

In the middle of the page, the integrand should be $x^3 - c$, not $x^3 - 1$.

page 613, Equation (11.9)

The three coefficients involving h^2 should be $1/(2h^2)$, $-1/h^2$, and $1/(2h^2)$, respectively. The correct form of Equation (11.9) is

$$P_2(x) = \frac{1}{2h^2}(x - x_2)(x - x_3)f_1 - \frac{1}{h^2}(x - x_1)(x - x_3)f_2 + \frac{1}{2h^2}(x - x_1)(x - x_2)f_3 \quad (11.9)$$

page 613, Figure 11.9

On the right half of the figure, the point labelled (x_{n-3}, f_{n-3}) should be (x_{n-4}, f_{n-4}) .

page 617

In the first line of the expression for $\int_a^b P_n(x) dx$, the second term has subscripts of 1 instead of 2. The correct expression is

$$\int_a^b P_n(x) dx = \int_a^b [L_1(x)f_1 + L_2(x)f_2 + \cdots + L_n(x)f_n] dx$$

page 621

In the last sentence on the page, change “which is a factor of 100 smaller than the error produced by Simpson’s rule” to “much smaller than the error produced by the Trapezoid rule”

page 636, Figure 11.13

In the right half of the diagram, the two intervals are incorrectly labelled as having a size of $1/2$ in the transformed coordinate z . The correct interval width is one, which is consistent with the magnitudes on the z axis.

page 649

In the second displayed equation from the top of the page, in Equation (11.41), and in Equation (11.42), replace $S_1 - S_2$ with $S_2 - S_1$. (In other words, make the change in three places.)

page 669, Exercise 7

The variable `y` does not appear in the `trapezoid` function. Change all occurrences of `y` to `f`. The displayed line of code should read

```
I = h * (0.5*f(1) + sum(f(2:n)) + 0.5*f(n));
```

On the first line of page 670, change `y(2:n-1)` to `f(2:n-1)`, and change `y(2:n)` to `f(2:n)`.

page 670, Exercise 8

A factor of 2 is missing from the second integral expression. The correct formula for V/u_c is

$$\frac{V}{u_c} = \int_0^1 2 \frac{u}{u_c} \eta \, d\eta$$

Chapter 12: Numerical Integration of ODEs**page 688, Equation (12.14)**

Change $f(t, y)$ to $f(t, z_j)$.

page 717

In the eighth line from the bottom of the page, change α_1 to α_2 . The sentence in the middle of the line should begin

The α_2 coefficient describes both ...

page 728, Exercise 8

The initial condition is $y = 1$, not $y = 1.x$.

page 729, Exercise 12.b

Change $\frac{1}{x + \alpha}$ to $\frac{1}{t + \alpha}$.

page 729, Exercise 12.e

Change the “b” to “ β ” in the denominator of the expression for $y(t)$. The correct expression for $y(t)$ is

$$y(t) = \frac{\alpha y_0}{\beta y_0 + (\alpha - \beta y_0) \exp(-\alpha t)}$$

page 733, Exercise 27

In the last word of the last sentence replace t with x so that the sentence ends

... by plotting dx/dt versus x .

Bibliography

page 736, Reference 24

“M.C.” should be “C. Moler”. The authors for reference 24 are

G. Forsythe, M. Malcolm, and C. Moler

Appendix A: Eigenvalues and Eigensystems

page 756

In the third line from the top of the page, insert “square roots of” before “eigenvalues”. The corrected text should read

the singular values of A are the square roots of the eigenvalues of $A^T A$ if $m \geq n \dots$

Appendix B: Sparse Matrices

page 764

In the MATLAB code in the bottom right corner of the page, change `a = 1:5;` to `a = (1:5)';` (note the transpose operator between the “)” and the “;”). This change is only necessary for the right hand code section.