Applied Linear Algebra, First Edition

by Peter J. Olver and Chehrzad Shakiban

Corrections to Third Printing (2013)

Last updated: July 1, 2018

⋆⋆⋆ Page xxii ⋆⋆⋆

Add Mary Halloran, Jeffrey Humpherys, and Sean Rostami to the acknowledgment in last paragraph.

⋆⋆⋆ Page 90 ⋆⋆⋆ Last displayed equation:

Correct last entry in third and fourth column vectors:

$$\begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix} = c_1 \begin{pmatrix} 1 \\ -2 \\ 1 \end{pmatrix} + c_2 \begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix} = \begin{pmatrix} c_1 + 2\,c_2 \\ -2\,c_1 - 3\,c_2 \\ c_1 + c_2 \end{pmatrix}.$$

⋆⋆⋆ Page 91 ⋆⋆⋆ First displayed equation:

Correct third equation:

$$c_1 + 2\,c_2 = 0, \qquad -2\,c_1 - 3\,c_2 = 1, \qquad c_1 + c_2 = -1.$$

⋆⋆⋆ Page 204 ⋆⋆⋆ Displayed equation in Proof of Theorem 4.16:

Middle term should be $y_k\,L_k(t_k)$:

$$p(t_k) = y_1\,L_1(t_k) + \cdots + y_k\,L_k(t_k) + \cdots + y_{n+1}\,L_{n+1}(t_k) = y_k,$$

⋆⋆⋆ Page 283 ⋆⋆⋆ Figure 5.13:

Change $x^2 - 2\pi x$ to $2\pi x - x^2$.

⋆⋆⋆ Page 284 ⋆⋆⋆ Figure 5.14:

Change $x^2 - 2\pi x$ to $2\pi x - x^2$.

⋆⋆⋆ Page 377 ⋆⋆⋆ Definition 7.46 is incomplete. Here is a corrected version::

Definition 7.46. A complex vector space V is called *conjugated* if it admits an operation of *complex conjugation* taking $\mathbf{u} \in V$ to $\overline{\mathbf{u}} \in V$ with the following properties: (a) conjugating twice returns one to the original vector: $\overline{\overline{\mathbf{u}}} = \mathbf{u}$; (b) compatibility with vector addition: $\overline{\mathbf{u} + \mathbf{v}} = \overline{\mathbf{u}} + \overline{\mathbf{v}}$; (c) compatibility with scalar multiplication: $\overline{\lambda\, \mathbf{u}} = \overline{\lambda}\, \overline{\mathbf{u}}$, for all $\lambda \in \mathbb{C}$ and $\mathbf{u}, \mathbf{v} \in V$.

⋆⋆⋆ Page 410 ⋆⋆⋆ line 16:

Delete ^{T} on formula for $S = (\, \mathbf{v}_1, \mathbf{v}_2, \ldots, \mathbf{v}_n \,)$.

⋆⋆⋆ Page 438 ⋆⋆⋆ **Definition 8.46**, first line:

Change $\mathbf{w}_1, \ldots, \mathbf{w}_j \in \mathbb{C}^m$ to $\mathbf{w}_1, \ldots, \mathbf{w}_j \in \mathbb{C}^n$.

⋆⋆⋆ Page 438 ⋆⋆⋆ line −2:

Change "Thus, $\mathbf{w}_2$ a generalized …" to "Thus, $\mathbf{w}_2$ is a generalized …"

⋆⋆⋆ Page 448 ⋆⋆⋆ Equation (9.8) and line 19:

Change $\dot{u} = A\mathbf{u}$ to $\dot{\mathbf{u}} = A\mathbf{u}$.

⋆⋆⋆ Page 455 ⋆⋆⋆ Exercise 9.1.22:

Change $\dot{u} = A\mathbf{u}$ to $\dot{\mathbf{u}} = A\mathbf{u}$.

⋆⋆⋆ Page 458 ⋆⋆⋆ Theorem 9.13:

Change $\dot{u} = A\mathbf{u}$ to $\dot{\mathbf{u}} = A\mathbf{u}$.

⋆⋆⋆ Page 465 ⋆⋆⋆ Exercise 9.2.18:

Change $\dot{u} = -\nabla H$ to $\dot{\mathbf{u}} = -\nabla H$.

⋆⋆⋆ Page 477 ⋆⋆⋆ Exercise 9.4.15:

Change $\mathbf{v} = A^T\mathbf{v}$ to $\dot{\mathbf{v}} = A^T\mathbf{v}$.

⋆⋆⋆ Page 481 ⋆⋆⋆ Exercise 9.4.34:

Change $\dot{u} = A\mathbf{u} + e^{\lambda t}\,\mathbf{v}$ to $\dot{\mathbf{u}} = A\mathbf{u} + e^{\lambda t}\,\mathbf{v}$.

⋆⋆⋆ Page 483 ⋆⋆⋆ Equation (9.55):

Correct final formula:

$$e^{t A_z} = \begin{pmatrix} \cos t & -\sin t & 0 \\ \sin t & \cos t & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

⋆⋆⋆ Page 488 ⋆⋆⋆ line after (9.70):

Change $r_i > 0$ to $r_i \geq 0$.

⋆⋆⋆ Page 501 ⋆⋆⋆ Lines 2–4 after (9.96):

Switch "first" and "second":

. . . — the second, vibrating with frequency ω, represents the internal or natural vibrations of the system, while the first, with frequency η, represents the response . . .

⋆⋆⋆ Page 523 ⋆⋆⋆ Exercise 10.1.41:

Change $x_0, x_1, \ldots$ to $u^{(0)}, u^{(1)}, \ldots$

⋆⋆⋆ Page 526 ⋆⋆⋆ Line 4:

Change $-\frac{2}{3}$ to $\frac{2}{3}$: $\mathbf{u}^{(k)} \approx c_1 \left(\frac{2}{3}\right)^k \mathbf{v}_1$

⋆⋆⋆ Page 526 ⋆⋆⋆ Line 5:

Change $\lambda_1 = -\frac{2}{3}$ to $\lambda_1 = \frac{2}{3}$:

⋆⋆⋆ Page 526 ⋆⋆⋆ Line 8:

Change ". . . the first ten iterates are" to ". . . iterates $\mathbf{u}^{(11)}, \ldots, \mathbf{u}^{(20)}$ are"

⋆⋆⋆ Page 564 ⋆⋆⋆ Lines 15–17:

Change

the parameter t_1 so that the corresponding residual vector

$$\mathbf{r}_1 = \mathbf{f} - K\,\mathbf{u}_1 = \mathbf{r}_0 - t_1 K\,\mathbf{v}_1 \qquad (10.91)$$

is as close to $\mathbf{0}$ (in the Euclidean norm) as possible. This occurs when $\mathbf{r}_1$ is orthogonal to $\mathbf{r}_0$ (why?), and so we require

$$0 = \mathbf{r}_0^T \mathbf{r}_1 = \|\,\mathbf{r}_0\,\|^2 - t_1 \mathbf{r}_0^T K\,\mathbf{v}_1 = \|\,\mathbf{r}_0\,\|^2 - t_1 \langle\!\langle\, \mathbf{r}_0\,, \mathbf{v}_1 \,\rangle\!\rangle = \|\,\mathbf{r}_0\,\|^2 - t_1 \langle\!\langle\, \mathbf{v}_1\,, \mathbf{v}_1 \,\rangle\!\rangle. \qquad (10.92)$$

to

the parameter t_1 that minimizes

$$p(\mathbf{u}_1) = p(t_1 \mathbf{v}_1) = \tfrac{1}{2}\, t_1^2 \mathbf{v}_1^T K\,\mathbf{v}_1 - t_1 \mathbf{v}_1^T \mathbf{f} = \tfrac{1}{2}\, t_1^2 \langle\!\langle\, \mathbf{v}_1\,, \mathbf{v}_1 \,\rangle\!\rangle - t_1 \|\,\mathbf{r}_1\,\|^2. \qquad (10.91)$$

⋆⋆⋆ Page 564 ⋆⋆⋆ Line 7 from bottom:

Correct second and third terms in displayed formula:

$$0 = \langle\!\langle\, \mathbf{v}_2\,, \mathbf{v}_1 \,\rangle\!\rangle = \langle\!\langle\, \mathbf{r}_1 + s_1 \mathbf{v}_1\,, \mathbf{v}_1 \,\rangle\!\rangle = \langle\!\langle\, \mathbf{r}_1\,, \mathbf{v}_1 \,\rangle\!\rangle + s_1 \langle\!\langle\, \mathbf{v}_1\,, \mathbf{v}_1 \,\rangle\!\rangle,$$

⋆⋆⋆ Page 565 ⋆⋆⋆ Line 7:

Delete "as small as possible, which is accomplished by requiring it to"

⋆⋆⋆ Page 565 ⋆⋆⋆ Line -16:

Delete "as small as possible, by requiring it be"

$\star\star\star$ Page 572 $\star\star\star$ change final sentence::

For each eigenvalue, the computation of the corresponding eigenvector can be most efficiently accomplished by applying the shifted inverse power method of Exercise 10.6.7 with parameter μ chosen near the computed eigenvalue.

$\star\star\star$ Page 607 $\star\star\star$ Equation (11.59):

The middle expression is missing a c in the denominator:

$$G(x,y) = \frac{(1-y)x - \rho(x-y)}{c} = \begin{cases} x(1-y)/c, & x \le y, \\ y(1-x)/c, & x \ge y, \end{cases} \tag{11.59}$$

$\star\star\star$ Page 660 $\star\star\star$ Solution 2.5.5 (b):

$\mathbf{x}^\star = (1, -1, 0)^T, \quad \mathbf{z} = z\left(-\frac{2}{7}, -\frac{1}{7}, 1\right)^T;$

$\star\star\star$ Page 683 $\star\star\star$ Solution 8.5.1 (a):

$\sqrt{3 \pm \sqrt{5}}$

$\star\star\star$ Page 685 $\star\star\star$ Solution 9.1.28 (g):

Change $\dot{u} = \begin{pmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ -1 & 0 & 0 \end{pmatrix} \mathbf{u}$ to $\dot{\mathbf{u}} = \begin{pmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ -1 & 0 & 0 \end{pmatrix} \mathbf{u}.$

$\star\star\star$ Page 691 $\star\star\star$ Solution 10.3.24 (e):

Change $-2.69805 \pm .806289$ to $-2.69805 \pm .806289\,\mathrm{i}$.

