MAT400: Advanced Linear Algebra **David Hiebeler**
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Corrections to "Applied Linear Algebra" by Olver and Shakiban

Please let me know if you disagree with any of these, or find any typos in my list of typos! These corrections were in addition to the ones listed on the book's web site, http://www.math.umn.edu/~olver/ala.html, although they have been submitted to the authors and I believe are now included in their list. Thanks to the authors for finding some errors in my corrections, and for writing the textbook, which I enjoyed.

1. page 43, lines 3–4: "D is a diagonal matrix having the nonzero pivots on the diagonal." Pivots are by definition nonzero (as stated on page 13), so this is redundant at best, and at worst slightly misleading because it implies there are zero pivots.

2. page 51, in the second displayed equation near the top of the page, the "j" should be a "$j-1$":
$$\sum_{j=1}^{n}(j-1) = \frac{n^2-n}{2}.$$

3. page 57, in the last displayed equation 3 lines from the bottom, the 3210 should be a 32100:
$$10x + 1600y = 32100, \quad x + .6y = 22.$$

4. page 58, in the augmented matrix in the first paragraph, the 3210 should be a 32100:
$$\left(\begin{array}{cc|c} 1600 & 10 & 32100 \\ .6 & 1 & 22 \end{array}\right).$$

5. page 106, exercise 2.4.24 (b), I believe "Under the hypotheses of part (b)" should say "of part (a)".

6. page 118, the paragraph right below equation (2.42), where it says "Solving the homogeneous system $\widehat{U}\mathbf{y} = \mathbf{0}$, ...". This is incorrect. Solving that homogeneous system would give one free variable, and therefore one vector in the basis. Instead, we just take the two nonzero (row) vectors of $\widehat{U}$ to be the basis vectors for corng A^T and therefore the basis vectors for rng A.

7. page 130, first paragraph: very awkward phrase, "both in both". Apparently the first "both" refers to "inner products and norms," while the second "both" refers to finite- and infinite-dimensional vector spaces. The word "both" is used again in the next sentence, even though it lists three (rather than two) uses of inner products.

8. page 161, the last displayed equation before Proposition 3.34: the "dt" in the integral should be "dx."

9. page 161, the two lines just above Proposition 3.34: this result does not depend on Theorem 3.31. It relies on Proposition 3.25, as well as Theorem 3.28 (together with the result from exercise 2.3.36).

10. page 162, exercise 3.4.32: $K = A^TA$ should be $K = A^TCA$ (unless the dot product is assumed, as in equation (3.54), but the solution in the back of the book includes the C matrix).

11. page 163, exercise 3.4.35: the problem is not phrased clearly, when first reading it, I wondered "What is A?" I thought perhaps we were to assume $A = A_1 + A_2$, but then $K = A^TCA$ would clearly be a Gram matrix. A better way to phrase the problem would be "Show that K is also a Gram matrix, by finding a matrix A such that $K = A^TCA$."

12. page 168, third line of text above (3.71): bad phrasing: "M is a lower triangular matrix with all positive entries, ..." makes it sound like all of the entries in M are positive, but in fact only the entries on the diagonal need to be positive, as can be seen in example 3.40.

13. page 177, exercise 3.6.29 (e): the question asks whether the vectors form an orthonormal basis of $\mathbb{C}^3$, but the term "orthonormal" isn't defined until page 218.

14. page 179, exercise 3.6.51: "For each the following..." should be "For each of the following...".

15. page 201, first line below eqn (4.43): delete the first word "coefficient," i.e. make it read, "The $m \times (n+1)$ coefficient matrix is..."

16. page 221, exercise 5.1.11: the second vector should be $\mathbf{u}_2 = \pm \begin{pmatrix} \sin\theta \\ -\cos\theta \end{pmatrix}$, since as it's currently written, $\begin{pmatrix} \sin\theta \\ \pm\cos\theta \end{pmatrix}$, if one chooses the "+" sign one does not obtain an orthgonal basis (unless $\theta = \pi/2$ or $3\pi/2$).

17. page 274, after the "Remark": "rather than solving to homogeneous..." should be "rather than solving the homogeneous...".

18. page 279, first line of eqn (5.90): The last element of ω_k should be $e^{\mathrm{i}kx_{n-1}}$, not $e^{\mathrm{i}kx_n}$.

19. page 285, last paragraph: I believe "We use $n = 2^8 = 256$ sample points..." should be "We use $n = 2^9 = 512$ sample points, since it then goes on to talk about the $n = 512$ Fourier coefficients $c_{-256}, \ldots, c_{255}$.

20. page 296, eqn (6.9): it looks like the last element of the last row is "1–1", i.e. there should be more space between the "1" and the "–1", making it clear that those are the last two elements of the row.

21. page 298, two lines above (6.15): "$K\mathbf{x} = \mathbf{f}$" should be "$K\mathbf{u} = \mathbf{f}$" (thanks to Isaac Michaud for catching this one).

22. page 298, four lines below (6.15): $\mathbf{y} = A^{-1}\mathbf{f}$ should be $\mathbf{y} = A^{-T}\mathbf{f}$.

23. page 313, near end of second full paragraph: delete the word "the" in "in the Section 6.1".

24. page 317, the displayed equation right above (6.51): the right-hand side of the first equation should be vector $\mathbf{0}$, not scalar 0:
$$\mathbf{f}_i + \sum_k (-y_k \mathbf{n}_k) = \mathbf{0}$$

25. page 319, last line: "forces around the first node" should be "forces around the third node."

26. page 320, two lines above the displayed equation for A^{**}: "This serve to also..." should be "This serves to also..."

27. page 323, last paragraph, just below the equations for $y_1, \ldots, y_4$: the bars are referred to as bars 1, 2, 3, and 4, but they were not labeled in Figure 6.16 as they were e.g. in Figure 6.10. (However, from A, one can deduce that bar 1 connects nodes 1 and 2, bar 2 connects nodes 2 and 3, bar 3 connects nodes 3 and 4, and bar 4 connects nodes 2 and 4.) Actually it would be nice if the bars were labeled in all of the figures in this section.

28. page 325, the text near the bottom, just above the displayed equation for K^*: "the three bars" should be "the five bars".

29. page 327, exercise 6.3.5 (b): the external forces applied were not given. The authors presumably intended for the problem to be solved with general external forces being applied at the nodes.

30. page 399, the very last line: in the second expression, the conjugate should be taken of the entire product, but it looks like only the conjugate of A is being taken. That is, it should be $\overline{A}\overline{\mathbf{v}} = \overline{A\mathbf{v}} = \overline{\lambda\mathbf{v}} = \overline{\lambda}\overline{\mathbf{v}}$.

31. page 400, 2 lines above the "Remark": "they are merely complex linear combinations of the real eigenvalues" should say "they are merely complex linear combinations of the real eigenvectors."

32. page 411, last line: delete the word "the" in "of the Section 8.6".