Student Solution Manual

Vector Calculus, Linear Algebra, and Differential Forms: A Unified Approach, 5th Edition

Notes and errata, complete as of July 14, 2017

Many thanks to Chester Balestra, Wayne Fincher, Christopher Foo, Radu Grosu, Kabir Kapoor, Alexander Kroeber, and Ravi Ramakrishna for their contributions to this list.

Page 18 Solution 1.5.5, part d: In the third line, "the rationals aren't closed" should be "the irrationals aren't closed". In the fourth line, "the irrationals aren't closed" should be "the rationals aren't closed".

Page 18 [added May 27, 2017] Exercise 1.5.7 b: "inside the parabola" should be "outside the parabola".

Page 21 Solution 1.5.21: Part b corresponds to an exercise that was dropped from the text, so

a in the text corresponds to a in the solutions.

b in the text has no solution.

c in the textcorresponds to d in the solutions.

d in the text corresponds to e in the solution,

or,

a in the solution manual remains a

c in the solution manual becomes b

d in the solution manual becomes c

e in the solution manual becomes d

Page 22 In the margin note on page 22, "part d of Solution 1.5.21" should be "part c of Solution 1.5.21".

Page 22 Parentheses are missing in the first displayed equation of Solution 1.5.23, part b; the equation should be

$$\left|(I+H-I)^{-1}\big((I+H)^2-I^2\big)-2I\right|<\epsilon. \tag{2}$$

The mistake is repeated in the next equation; the left side should be

$$\left|(I+H-I)^{-1}\big((I+H)^2-I^2\big)-2I\right|$$

Page 27 In the first margin note, "absolute value" should be "length".

PAGE 38 In the next-to-last line of Solution 1.37, "no such solution" should be "no such solutions".

PAGES 59–60 There are errors in Solution 2.7.5, parts a and b. In part a, the correction starts with the second line of the displayed equation introduced by "and finally". Starting with this equation, the solution should be

$$\begin{bmatrix} 0 & 1 \\ 1 & 2 \end{bmatrix}^n = S \begin{bmatrix} (1+\sqrt{2})^n & 0 \\ 0 & (1-\sqrt{2})^n \end{bmatrix} S^{-1}$$
$$= \frac{\sqrt{2}}{4} \begin{bmatrix} (\sqrt{2}-1)(1+\sqrt{2})^n + (\sqrt{2}+1)(1-\sqrt{2})^n & (1+\sqrt{2})^n - (1-\sqrt{2})^n \\ (\sqrt{2}-1)(1+\sqrt{2})^{n+1} + (\sqrt{2}+1)(1-\sqrt{2})^{n+1} & (1+\sqrt{2})^{n+1} - (1-\sqrt{2})^{n+1} \end{bmatrix}.$$

Multiplying this by $\begin{bmatrix} b_0 \\ b_1 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ we find

$$b_n = \frac{(1+\sqrt{2})^n + (1-\sqrt{2})^n}{2}$$

The corrected solution to part b is:

b. Since $|1-\sqrt{2}| < 1$, it will contribute practically nothing to b_{1000}, and $\frac{1}{2}(1+\sqrt{2})^{1000}$ has the same number of digits and the same leading digits as b_{1000}. You will find that your calculator will refuse to evaluate this, but using logarithms base 10 for a change, you find

$$\log_{10} b_{1000} \approx 382.475,$$

so b_{1000} has 382 digits, starting with 2983.

PAGE 61 Line 2: there should be no plus sign before λ_1^n.

PAGE 62 Solution 2.8.5, first line: $x_{n+1} = \dfrac{2x_n s + 9}{3x^2}$ should be

$$x_{n+1} = \frac{2x_n^3 + 9}{3x_n^2}.$$

Last line of part b: $\sup_x \in U_1$ should be $\sup_{x \in U_1}$.

PAGE 66 Solution 2.9.5, fourth line: It should be
"i.e., $2x^2 + x - 1 = 0$", not "i.e., $x^2 + x - 1 = 0$".

PAGE 78 Solution 2.23, line after the first displayed equation: "$n + m \times n$ matrix" should be "$(n + m) \times n$ matrix".

PAGE 84 Solution 2.41: The next-to-last displayed equation is missing a $-n^2 + n$ on the left. It should be

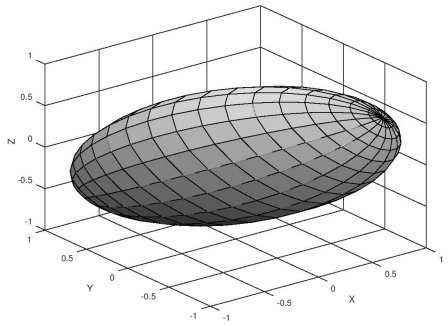
$$2n^3 - 2n^2 + n + 2n^2 - n = 2n^3.$$

Pages 106–107 [new, July 14, 2017] The solution to Exercise 3.5.17 part b is wrong; the quadratic form was computed incorrectly. The correct solution, courtesy of Chester Balestra, is:

b. The quadratic form corresponding to the matrix $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix}$ is

$$2(x^2 + y^2 + z^2 + xy + yz) = 2\left(\left(x + \frac{y}{2}\right)^2 + \left(z + \frac{y}{2}\right)^2 + \left(\frac{y}{\sqrt{2}}\right)^2\right),$$

which has signature $(3, 0)$. This formula describes an ellipsoid. It is shown in the figure below, also provided by Chester Balestra.



Page 131 Solution 3.29: In the first displayed equation, $Q_{i,j}^{\top} A^t op Q_{i,j}$ should be $Q_{i,j}^{\top} A^{\top} Q_{i,j}$.

Page 131 Solution 3.29: The last term in the 7th line should be $a_{i,j}(\cos^2\theta - \sin^2\theta)$, not $a_{i,j}(cos^2\theta - \sin^2\theta$.