

VECTOR CALCULUS, LINEAR ALGEBRA AND  
DIFFERENTIAL FORMS: A UNIFIED APPROACH  
4TH EDITION, SECOND PRINTING

NEW ERRATA POSTED MARCH 11, 2015

PAGE 96 Example 1.5.25: Equation 1.5.49 would be better as

$$f \begin{pmatrix} x \\ y \end{pmatrix} = \begin{cases} \frac{|y|e^{-|y|/x^2}}{x^2} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0, y \neq 0 \end{cases}$$

PAGE 117 Two lines before inequality 1.6.25,  $b_j u^j$  should be  $|b_j u^j|$ , since  $b_j$  and  $u^j$  are complex numbers, so  $b_j u^j$  isn't a distance.

PAGE 130 First line: We don't need the triangle inequality here.

PAGE 138 Exercise 1.7.4: We should have defined the functions in parts b and c to be 0 at 0:

$$\text{b. } f(x) = \begin{cases} x \ln|x| & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases} \quad \text{c. } f(x) = \begin{cases} x/\ln|x| & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$$

PAGE 156 Exercise 1.9:  $S, T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ , not  $\mathbb{R}^4 \rightarrow \mathbb{R}^3$

PAGE 202 Figure 2.5.2: The caption for the left side should be "The function  $\frac{1}{x^2 + 1/10}$ , between  $x = -1$  and  $x = 1$ ".

PAGE 210 Exercise 2.5.21 has an extraneous  $H$ : let  $P_{\{\bar{\mathbf{v}}\}} H : \mathbb{R}^n \rightarrow \mathbb{R}^m$  should be let  $P_{\{\bar{\mathbf{v}}\}} : \mathbb{R}^n \rightarrow \mathbb{R}^m$ .

PAGE 218 Equation 2.6.29 should have primes on the right:

$$[P_{\bar{\mathbf{v}}' \rightarrow \bar{\mathbf{e}}}] = [\bar{\mathbf{v}}'_1, \dots, \bar{\mathbf{v}}'_n].$$

PAGE 243 The top line has an extraneous  $Y$ :  $\mathbf{f} \left( \frac{X}{Y} \right) Y = \begin{pmatrix} a \\ b \end{pmatrix}$  should be  $\mathbf{f} \left( \frac{X}{Y} \right) = \begin{pmatrix} a \\ b \end{pmatrix}$ .

PAGE 249 Bottom of page: We neglected to include  $D_2 D_1$  (we will see in Theorem 3.3.9 that  $D_2 D_1 = D_1 D_2$ ). So the list should be

$$\sup |D_1 D_1 f_1| \leq 3 = c_{1,1,1} \quad \sup |D_1 D_1 f_2| = 0 = c_{2,1,1}$$

$$\begin{aligned} \sup |D_1 D_2 f_1| \leq 1 = c_{1,2,1} & & \sup |D_1 D_2 f_2| = 0 = c_{2,2,1} \\ \sup |D_2 D_1 f_1| \leq 1 = c_{1,1,2} & & \sup |D_2 D_1 f_2| = 0 = c_{2,1,2} \\ \sup |D_2 D_2 f_1| \leq 1 = c_{1,2,2} & & \sup |D_2 D_2 f_2| = 2 = c_{2,2,2}. \end{aligned}$$

PAGE 260 First line after Definition 2.10.1: “If a continuous function  $f$  is monotone”, not “if a function  $f$  is monotone”.

PAGE 390 Exercise 3.8: We should have said that  $M_1(m, n)$  is the subset of  $\text{Mat}(m, n)$  consisting of matrices of rank 1.

PAGE 441 Margin note, last line: upper limit, not upper integral. Equation 4.5.10: the integral on the left should be over  $P$ , not over  $\mathbb{R}^3$ :

$$\int_P f \begin{pmatrix} x \\ y \\ z \end{pmatrix} |dx dy dz| = \int \left( \int \left( \int f dx \right) dy \right) dz.$$

PAGE 505 Equation 4.11.45: “where  $f_i(\mathbf{x}) = \dots$ ”, not “where  $f_i = \dots$ ”.

PAGE 509 Theorem 4.11.19, line before equation 4.11.67: We should have said “then  $f$  is L-integrable”, not “then  $f$  is integrable”.

PAGE 579 Example 6.3.6: “(i.e.,  $a$ ,  $b$ , and  $c$  are all nonzero)” not “(i.e., at least one of  $a$ ,  $b$ , and  $c$  does not vanish)”.

PAGE 580 Example 6.3.7, first line:  $X$  should be  $S$

PAGE 611 The last sentence of the paragraph beginning “Condition 1 of Definition 6.6.6” should be

“This follows from Proposition 5.2.2; indeed this set is a subset of finitely many affine subspaces of dimension  $k - 2$ . ”

PAGE 658 The cross product in the caption to Figure 6.11.4 should be  $\vec{h}(\mathbf{y}) \times \frac{\vec{x}-\mathbf{y}}{|\mathbf{x}-\mathbf{y}|^3}$ .

PAGE 681 Exercise 6.26 should read:

Show that the electromagnetic field of a charge  $q$  moving in the direction of the  $x$ -axis at constant speed  $v$  is

$$\begin{aligned} \vec{\mathbf{E}} &= \frac{q\gamma}{4\pi \left( (\gamma x - \gamma vt)^2 + y^2 + z^2 \right)^{3/2}} \begin{bmatrix} x - vt \\ y \\ z \end{bmatrix} \\ \vec{\mathbf{B}} &= \frac{v}{c} \frac{q\gamma}{4\pi \left( (\gamma x - \gamma vt)^2 + y^2 + z^2 \right)^{3/2}} \begin{bmatrix} 0 \\ -z \\ y \end{bmatrix}, \quad \text{where } \gamma = \frac{1}{\sqrt{1 - v^2/c^2}}. \end{aligned}$$

PAGE 701 Two lines before the exercises:

$$|\mathbf{y} - \mathbf{a}_0| \leq 2|\vec{\mathbf{h}}_0|, \quad \text{not } |\mathbf{y} - \mathbf{a}_0| \leq 2\vec{\mathbf{h}}_0.$$

PAGE 702 Exercise A5.1: In the second line,  $0 < \alpha$ , not  $0 \leq \alpha$ .

PAGE 710 Two lines before the remark, “ $\mathbf{F} \begin{pmatrix} \mathbf{x} \\ \mathbf{y} \end{pmatrix}$  implicitly defines  $\mathbf{x}$ ” should be “ $\mathbf{F} \begin{pmatrix} \mathbf{x} \\ \mathbf{y} \end{pmatrix} = \mathbf{0}$  implicitly defines  $\mathbf{x}$ ”.

PAGE 712 Last sentence of the proof: “the expression on the first line is symmetric”, not “the expression on the right is symmetric”.

PAGE 719 Equation A11.20: in the second line,  $\in$  should be  $\subset$ .

PAGE 731 Three lines before equation A15.3: “since  $Z$ , as a function of  $X$  and  $Y$ , starts with quadratic terms”, not “since  $Z$  as a function of  $X$  and  $Y$  that starts with quadratic terms”.

PAGE 745 In the last line, “i.e.,  $k$  is the first column” should be “i.e.,  $\mathbf{a}_k$  is the first column”.

PAGE 746 Two lines before equation A19.4:  $A_{1,i}$  should be  $A_{i,1}$ . In the same line,  $\tilde{A}_{1,i}$  should be  $\tilde{A}_{i,1}$ , as it should in equation A19.4. Recall that  $A_{i,j}$  is  $A$  with the  $i$ th row and  $j$ th column removed.

PAGE 749 Equation A19.15: In the first matrix,  $\tilde{B}$  should be  $\tilde{Q}$ .

PAGE 751 The right side of inequality A20.4 needs a factor of 2 in the denominator:  $K \frac{\sqrt{n}}{2 \cdot 2^N}$

PAGE 754 Margin note: The third line of the equation that starts  $\text{vol}_n \Phi(C)$  has an extra  $C$  that shouldn't be there:

$$= (1 + \epsilon)^n |\det[\mathbf{D}\Phi(\mathbf{z}_C)]C| \text{vol}_n C.$$

should be

$$= (1 + \epsilon)^n |\det[\mathbf{D}\Phi(\mathbf{z}_C)]| \text{vol}_n C.$$

PAGE 760 6th line: Using our current notation,  $L_{\chi_{A_k}}$  should be  $L_{\mathbf{1}_{A_k}}$ . In the second margin note, 3rd line,  $\int_Q \inf(f_k(\mathbf{x}), K)$  should be  $\inf(f_k(\mathbf{x}), K)$

PAGE 788 Three lines from the bottom:  $d\mathbf{f}^* = \mathbf{f}^*d$ , not  $d\mathbf{f}^* = \mathbf{f}^*d$ .

PAGE 781 When reprinting Theorem 6.7.2, we omitted part 3: The exterior derivative of a constant form is 0.

PAGE 797 In equation A26.33,  $|d^k \mathbf{x}|$  should be  $|d^{k-1} \mathbf{x}|$ . Equation A26.34 should be

$$\int_W |d^{k-1} \mathbf{w}| \underbrace{=}_{\text{Def. 5.3.1}} \int_W |d^{k-1} \mathbf{x}| \left( P_{\delta(\mathbf{w})}(D_1 \delta(\mathbf{w}), \dots, D_{k-1} \delta(\mathbf{w})) \right) |d^{k-1} \mathbf{w}|$$

The last four lines (beginning with “The integral”) should be replaced by

The integral

$$\int_W |d^{k-1}\mathbf{w}| \stackrel{\text{Def. 5.3.1}}{=} \int_W \underbrace{|d^{k-1}\mathbf{x}| \left( P_{\delta(\mathbf{w})}(D_1\delta(\mathbf{w}), \dots, D_{k-1}\delta(\mathbf{w})) \right)}_{\text{this function of } \mathbf{w} \text{ is the dominating function}} |d^{k-1}\mathbf{w}| \quad \text{A26.34}$$

is finite by the hypothesis that  $\partial_M^s X$  has finite  $(k-1)$ -volume, and we can use the “dominating function” above to prove that

$$\lim_{\epsilon \rightarrow 0} \int_{W_\epsilon} |d^{k-1}\mathbf{w}| = \int_W |d^{k-1}\mathbf{w}|.$$

PAGE 802 One line before equation A26.45, “of radius  $||\mathbf{D}f(\mathbf{x})||$ ” should be “of radius  $||\mathbf{D}f(\mathbf{x})||r$ ”.

#### NONMATHEMATICAL TYPOS

PAGE 102 First line after equation 1.5.67: proposition 1.4.11, not proposition 1.4.11 b

PAGE 116 2 lines before Figure 1.6.9: there is an extra absolute value; it should be  $\rho < |b_0/b_j|^{1/j}$ , not  $\rho < |b_0/b_j|^{1/j}|$ .

PAGE 140 Top margin note: “writing  $\mathbf{f}$  and  $\mathbf{g}$  as  $\vec{\mathbf{f}}$  and  $\vec{\mathbf{g}}$ ”, not “... in as  $\vec{\mathbf{f}}$  and  $\vec{\mathbf{g}}$ ”

PAGE 143 middle of page, part 7: “We do not need to prove”, not “We do not need prove”.

PAGE 219 Equations 2.6.33 and 2.6.34: In the vectors the entry  $a_{k,j}$  should be  $a_{k,j}$ .

PAGE 241 Example 2.8.10: The functions  $f_1$  and  $f_2$  should not be bold.

PAGE 242 In equation 2.8.45,  $\mathbf{F}$ , not  $\mathbf{f}$ .

PAGE 261 Lower margin note:  $\mathbf{f}^{-1}$  not  $f^{-1}$ .

PAGE 306 Exercise 3.1.21, part b: a space is needed before “is a smooth curve”.

PAGE 368 First margin note: “be be impressed” should be “be impressed”.

PAGE 670 First line of Example 6.12.3: given in equation 6.7.17, not given in Example 6.7.17.

PAGE 676 First margin note:  $df$  should be  $\mathbf{d}f$ .

PAGE 693 First line:  $\mathbf{x}_m, x_{m+1}$  should be  $\mathbf{x}_m, \mathbf{x}_{m+1}$ .