Student Solution Manual

Vector Calculus, Linear Algebra, and Differential Forms: A Unified Approach, 4th Edition

Notes and Errata

New errata posted July 10, 2015

Many thanks to Jordan Lenchitz for his contribution to this list.

Page 75 Solution 2.25: The solution to part b should read

The inverse of $[\mathbf{D}F(\mathbf{x})]$ is

$$[\mathbf{D}F(\mathbf{x})]^{-1} = \frac{1}{4xy-1}\begin{bmatrix} 2y & 1 \\ 1 & 2x \end{bmatrix} \quad \text{which at } \mathbf{x}_0 = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \text{ is } \quad \frac{1}{23}\begin{bmatrix} 6 & 1 \\ 1 & 4 \end{bmatrix},$$

so we have

$$\vec{\mathbf{h}}_0 = -\frac{1}{23}\begin{bmatrix} 6 & 1 \\ 1 & 4 \end{bmatrix}\begin{bmatrix} -1 \\ 1 \end{bmatrix} = \begin{bmatrix} +5/23 \\ -3/23 \end{bmatrix}, \quad \text{so} \quad \mathbf{x}_1 = \begin{bmatrix} 2+5/23 \\ 3-3/23 \end{bmatrix}.$$

The length of $[\mathbf{D}F(\mathbf{x}_0)]^{-1}$ is $\sqrt{54}/23$, so

$$|F(\mathbf{x}_0)| \ \left|[\mathbf{D}F(\mathbf{x}_0)]^{-1}\right|^2 \ M = \sqrt{2}\cdot\frac{54}{23^2}\cdot 2 \approx 0.289 < \frac{1}{2},$$

so Newton's method converges, to a point of the disc of radius

$$|\vec{\mathbf{h}}_0| = \frac{\sqrt{34}}{23} \approx .25 \quad \text{around } \mathbf{x}_1.$$

Page 158 An equal sign is missing from the very end of Solution 4.10.21: $\frac{\pi}{2}\left(\frac{\pi}{2}-\frac{\pi}{8}\right)\frac{3\pi^2}{16}$ should be $\frac{\pi}{2}\left(\frac{\pi}{2}-\frac{\pi}{8}\right) = \frac{3\pi^2}{16}$.

Page 186 Solution 5.4.1: An integral is missing from the displayed equation, and there are unnecessary absolute values. In the existing integral, $\pi/2$ should be the upper limited, not part of the lower limit. The end of the solution to part b should read:

Thus the image of the Gauss map has area

$$\int_0^{2\pi}\int_{\arcsin\frac{a}{\sqrt{1+a^2}}}^{\frac{\pi}{2}} \cos\varphi\, d\varphi\, d\theta = 2\pi\left[\sin\varphi\right]_{\arcsin\frac{a}{\sqrt{1+a^2}}}^{\frac{\pi}{2}} = 2\pi\left(1-\frac{a}{\sqrt{1+a^2}}\right).$$

Page 239 Solution 6.12.7: In the first line of equation 3, the 2-form on the right should be $dx\wedge dy$, not $dy\wedge dt$.

Page 242 Solution 6.7, part b: The first two lines would be better as

The 3-form

$$\Omega_{\mathbf{x}} : (\vec{\mathbf{v}}_1, \vec{\mathbf{v}}_2, \vec{\mathbf{v}}_3) \mapsto \det[\mathbf{x}, \vec{\mathbf{v}}_1, \vec{\mathbf{v}}_2, \vec{\mathbf{v}}_3].$$

Two lines later, $\omega_{\mathbf{x}}$ should be $\Omega_{\mathbf{x}}$.

PAGE 243 Solution 6.11: The two $\vec{\gamma}$ (one halfway down the solution, the other in the last line) should be γ, without the arrow.