

**Typos and Errors In  
Geometric Methods and Applications  
For Computer Science and Engineering**

by  
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The  $P$  in  $RP^n$  and  $CP^n$  should be in blackboard font (`mathbb`) everywhere.

xi, line -5, change “A a general” to “As a general”

3, line 25, move the period inside the right quote after “ $a$  and  $b$ ”.

10, line -1, change  $x = (x_1, x_2, x_3)$  to  $a = (a_1, a_2, a_3)$ .

15, line -9, insert “a” between “is” and “paraboloid”

19, line -7, change “define as the set” to “defined as a set”

22, line -5, equation  $a(x-x_0)+b(y-b_0) = 0$  should be  $a(x-x_0) + b(y-y_0) = 0$ .

23, line 6, 7, and 12,  $c$  should be  $b$ .

24, -10, change the leftmost occurrence of  $E$  to  $\overrightarrow{E}$

24, line -9, change all  $U$  to  $\overrightarrow{U}$  and all  $E$  to  $\overrightarrow{E}$

24, line -8, insert “of  $E$ ” before “that contain”

25, line 12, change  $a + \lambda u$  to  $a + \lambda v$

30, line 2 and in the legend of Figure 2.9, add “and their convex hulls”

51, in Problem 2.9, line 18, delete “and 2.8”

51, line -3, change “not” to “nor”

63, line -4, change “Millman” to “Milman”

65, The proof of Carathéodory’s theorem can be shortened a little (see the web site)

67, Helly’s theorem (Theorem 3.3.2) can be given a shorter proof (see the web site)

74, In Lemma 4.1.1, to insure the commutativity of  $\hat{+}$ , case 3 should be

$$\langle a, \lambda \rangle \hat{+} u = u \hat{+} \langle a, \lambda \rangle = \langle a + \lambda^{-1}u, \lambda \rangle$$

78, line -4, in Lemma 4.2.1, there should be a vector above the right hand expression

181, line 8, change “space” to “spaces”

194, line 1, change  $\varphi(x, x) > 0$  to

$$\varphi(x, x) \geq 0.$$

194, line 10, change “if” to “iff”

200, line 17, change  $\|w^2\|$  to  $\|w\|^2$

202, line 3, change  $\mathbf{SO}(n)$  to  $\mathbf{O}(n)$

206, line 11, change “orthogonal to  $H$ ” to “containing a line,  $L$ , orthogonal to  $H$ ”

208, line -10, add “be” between “must” and “changed”

209, line 9, change  $\theta$  to  $\varphi$

209, line 12, delete rightmost ) in (or  $2\pi - \theta$ )

209, line 16, change  $p = 3$  to  $p = 1$

209, line 17, change  $p = 1$  to  $p = 0$

210, line -1, change “rigid motion of determinant +1” to “proper affine rigid motion”

211, line 1, change “ $n$  flips” to “at most  $n$  flips”

221, In Section 7.6,  $p_F$  and  $p_G$  should be  $p_{\overrightarrow{F}}$  and  $p_{\overrightarrow{G}}$

222, all occurrences of  $p_G$  should be  $p_{\overrightarrow{G}}$

223, line 1,  $g \circ f$  should be  $\overrightarrow{g \circ f}$

223, line 4,  $g \circ f(a) = f(a)$  should be  $g \circ f(a) = g(a)$

223, line 5,  $\mathbf{af}(\mathbf{a})$  should be  $\mathbf{ag}(\mathbf{a})$

223, line 15, delete the comma after  $E$  in  $\{a \in E \mid g(a) = a\}$

225, line 9, change  $g_1$  to  $\overrightarrow{g_1}$

226, Figure 7.5, change  $f(v)$  to  $\overrightarrow{f}(v)$

228, Figure 5.8 is incorrect (no  $g$  and  $\tau$ )

231, third paragraph, line 4, see corrected page

235, line 8 in the proof, see corrected page

235, line 20, change  $v_2$  to  $w_2$

236, line -12, delete the rightmost paren )

236, line -10, -8, change  $\lambda_E$  to  $\lambda_{\overrightarrow{E}}$

244, in Pb. 7.8, change  $\lambda_E(\mathbf{a}_0\mathbf{a}_1, \dots, \mathbf{a}_0\mathbf{a}_n)$  to  $\lambda_{\overrightarrow{E}}(\mathbf{a}_0\mathbf{a}_1, \dots, \mathbf{a}_0\mathbf{a}_n)$

245, In Problem 7.11, question (c), it is necessary to assume that  $D$  and  $D'$  are not coplanar.

246, line 9,  $U \cap W'$  and  $V \cap W'$  should be  $\overrightarrow{U \cap W'}$  and  $\overrightarrow{V \cap W'}$

268, 269, 270, change  $\overrightarrow{hm}$  and  $\overrightarrow{ab}$  to  $\mathbf{hm}$  and  $\mathbf{ab}$

271, in Lemma 9.1.2, it is also necessary to assume that the points in  $P$  do not belong to a common hyperplane.

273, line -6, change  $O(\log n)$  to  $O(n \log n)$

277, in Definition 9.2.3, define a  $d$ -triangulation of  $S$  so that

$$S = \bigcup_{\substack{\sigma \in K \\ \dim(\sigma) = d}} \sigma,$$

i.e.,  $S$  is the union of all  $d$ -simplices in  $K$

278, line 10, insert “connected” in front of “closed polygon”

278, line -4, change “by (1) by get” to “by (1) we get”

281-282, end of page 281, top of page 282, and bottom of page 282, small corrections, see the web page.

285, in Problem 9.3, change “half-planes” to  $n$  “half-planes” and  $O(\log n)$  to  $O(n \log n)$

287, line 2 of Section 10.1, “Chapter 10” should be “Chapter 6”

288, in Definition 10.1.1, change to: “Given two vector spaces  $E$  and  $F$  ...,” and change  $f: E \rightarrow E$  to  $f: E \rightarrow F$

291, line 7, “Chapter 25” should be “Chapter 26”

306, line 11, change  $\varphi(x, x) > 0$  to  $\varphi(x, x) \geq 0$

312, line 10, delete the subscript  $\mathbf{C}$  on the right hand side of the equation:

$$f_{\mathbf{C}}^*(u + iv) = f^*(u) + if^*(v).$$

314, line -11,  $f$  should be  $f_{\mathbf{C}}$ .

315, line 6,  $f$  should be  $f_{\mathbf{C}}$ .

317, the end of the proof is incorrect. When  $\mu > 0$ , we need to swap  $u/\|u\|$  and  $v/\|v\|$

318, line 7 in the proof, Lemma 11.2.8 should be Lemma 11.2.7

318, before the Remark, change “adoint” to “adjoint”

329, line 11,  $H_{n-1}$  should be  $H_{n-2}$

337, line 1, change “due” to “do”.

339, middle of the page, Theorem 12.2.1 should be Theorem 12.1.3.

342, line -3,  $m \leq n$  should be  $m \geq n$

352, line 9, wrong accent in “prévaloir”

342, line 2 can be simplified to  $RS = VU^TUDU^T = VDU^T = A$ .

354, line 15, change 2.11.3 to 2.11.2(2).

355, line 5, state that  $D$  is an  $m \times n$  matrix, and line 7, that  $D^+$  is an  $n \times m$  matrix.

355, line 15, change  $U$  to  $F$ , to avoid a clash with  $U$  in  $A = VDU^T$

357, line -2,  $x_i > 0$  should be  $x_i^2 > 0$

359, line 18, insert “be” between “must” and “satisfied”

364, in Problem 13.3,  $y_y$  should be  $y_m$

365, in Problem 13.10,  $y_1 + 4y_2^2 = 1$  should be  $y_1^2 + 4y_2^2 = 1$ .

367, line -1, “Lie algebra” should be “Lie group”

371, line -9, add “and  $a \neq -1$ ” to  $a < 0$

372, line -11, insert “of” between “is” and “the”

382, middle of the page, Theorem 12.2.1 should be Theorem 12.1.3.

385, the proof is not quite right. It is easily fixed, see the web page.

388–390, the proof of Theorem 14.6.4 can be improved using the observation that  $V = \int_0^1 e^{\Omega t} dt$ , see the web page.

394, line 1,  $\varphi^{-1}$  should be  $\varphi_1^{-1}$

396, line -4,  $\gamma(0) = p$  should be  $\gamma(t) = p$

396, line -3,  $I$  should be  $J$

397, line 1, the  $I$  in  $u \in I$  should be  $J$

397, regarding Definition 14.7.6, mention that the notion of smooth map (in clause (c)) is postponed until Definition 14.7.11.

397, in Definition 14.7.7, delete “that” between “is” and “a”

398, line 8, delete “a” before  $W$ .

398, line -12, -9, -7, -6, -5, -4,  $R^n$  should be in blackboard font ( $\mathbf{R}^n$ ).

414, line 9, change  $\theta_2 \neq \theta_1$  to  $\cos \theta_2 \neq \cos \theta_1$ .

424, line -6, change “If is” to “It is”

442, 443, except in lines 8, 9, 10, 13, all occurrences of  $\mathbf{n}$  and  $\mathbf{n}'$  should be  $\mathbf{N}$  and

$\mathbf{N}'$  (see the corrected pages on the web)  
 442, line -7,  $N'$  should be  $\mathbf{N}'$   
 443, line 10,  $N'$  should be  $\mathbf{N}'$   
 443, line -4,  $-\tau\mathbf{t} + \kappa\mathbf{n}$  should be  $-\tau\mathbf{t} + \kappa\mathbf{b}$   
 450, line 3, delete the comma in “cubic,;”  
 451, line 5, add  $-$  in front of  $(e_1, \dots, e_n)$   
 466, line 12, change “in” to “is”  
 483, in Section 16.5, line 2, change  $\kappa_n$  to  $\kappa_g$ . In line 9 of the same paragraph, change “form” to “for”  
 490, line 7, delete one of the periods in “..”  
 491, line 3, the equation should be

$$L \left( \frac{x}{y} \right)^2 + 2M \frac{x}{y} + N = 0.$$

493, line -1,  $\mathbf{n}_p$  should be  $\mathbf{N}_p$   
 498, line 3, the second  $J(\mathbf{N}_{(u,v)})$  should be  $J(d\mathbf{N}_{(u,v)})$   
 498, line 15,  $\kappa$  should be  $\kappa_N$   
 498, line 20,  $J(\mathbf{N}_{(u,v)})$  should be  $J(d\mathbf{N}_{(u,v)})$   
 502, line -8, Section 16.7 should be Section 16.6  
 508, line 13,  $\kappa_N$  should be  $-\kappa_N$   
 509, line 8, the occurrence of  $\mathbf{N}$  in  $(-\kappa_N\mathbf{t} + \tau_g\mathbf{n}_g) \cdot \mathbf{N}$  should be  $\mathbf{n}$   
 509, line 9, 11, the occurrence of  $\mathbf{N}$  in  $\mathbf{n}_g \cdot \mathbf{N}$  should be  $\mathbf{n}$   
 513, line -7, “point  $p$ ” should be “point  $q$ ”