Corrections to Elementary Differential Geometry, Second Edition (Apr '06)

I am grateful to Allen B. Altman and Joseph E. Borzellino for most of these corrections.   Note: Since HTML cannot space mathematical italics properly, many ordinary letters below should be read as italic.

Ch.1

Page/Line   Correction

15/-6   Should read: $V[x_i]$ U_i (subscript "i").

24/-8   Should read $\mathbf{R}^3$, not $\mathbf{R}^2$, and $f_i= \phi (U_i)$, with both subscript "i".

26/-2   Should read "$=xU_1$"   (subscript "1", not "i").

26/-11   Formula should end: "$...+2)v_3$".

32/11   Should read r,ϑ,z   not r, ϕ,z.

36/-1   Should read $...=\mathbf{v}[f_i]$, not $...=\mathbf{v}[f]$.

39/11   Should read: F_{*p} not F^*p.

Ch.2

44/-1   The dot product should be: $\mathbf{v} \cdot \mathbf{e}_i$ (subscript "i", not "1").

50/4   The upper limit in the integral should be "t", not "1".

50/7   Replace $=0_j$ by $=0$; (semicolon).

65/-15   Should be kappa tilde, not plain kappa.

66/4   Should read $\sigma=1/\tau$, not $\sigma =1/r$.

66/7   Should read: $\gamma= \alpha +\rho N+ \rho'\sigma B$.

75/14   Should read: Example 4.2(2) of Chapter 1.

83/-10   Should read ...increasing ϑ,   not ... increasing ϕ.

85/-9   Should read: $\omega_{ji}= -\omega_{ij}$.

88/-2,-1   In the first matrix, replace "1" by "0". In the third matrix, both thetas should be "ϑ".

89/4   Add a minus sign following "=", giving "$...= - d\vartheta$

90/6   In Ex.6, add the hypothesis $V[r]=r$.

90/8   In Ex.7, replace the sentence "For simplicity, define..." by "(*Hint:* For *Maple,* use the differential operator d from the *difforms* package. For *Mathematica,* use the total differential operator Dt.)"

94/-2   Delete the comma between ϕ and d.

Ch.3

102/6   Should read: $F(\mathbf{p})=\mathbf{q}$.

116/-6   Insert subscript V on the left side of the equation, between del and W.

121/15   In (2), replace E_2 by E_i.

121/-1   Each E_i should have an overbar.

123/14   Rename this exercise "Congruence of curves" and replace the second sentence of (b) by: "Find an isometry F=TC that carries α to β.

Ch.4

125/7   Should read: $\mathbf{R}^3$, not $\mathbf{R}^2$.

134/2   Replace the first sentence in Ex.12 by: Let C be a connected Curve in $\mathbf{R}^2$ (p.21) that is non-trivially symmetric about the x-axis. Show that (a) C crosses the x-axis, (b) all such crossings are orthogonal to the x-axis (*Hint:* A figure 8 is not a Curve.), (c) there is either one such crossing or two, giving Curves like those in Fig. 4.9.

138/middle   The third equation should read: $r \sin v = r \sin v_1$

142/9   Should read $-1 \le u \le 1$,   not $-1 \le v \le 1$.

147/-1   Shrink "subspace" to "space".

152/6   In the right side of the equation, the denominator should be $\|\mathbf{x}_v\|$, not $\|\mathbf{x}_u\|$.

172/-11   The first double integral in the Proof should be over R, not over $\mathbf{x}$.

172/-10   Should have $g=\phi (\mathbf{x}_v)$,   not $\mathbf{x}_u$.

172/-9   This formula should be labeled (1), for reference on p.173.

175/5   The integrand should be ϕ, not ϑ.

176/13   Should read: ...and η is a 2-form on N, then $\int_{\mathbf{x}} F^*\eta = \int_{F(\mathbf{x})} \eta$.

177/9   (U,V) should map [cap script S] to [cap script R].

177/14   In the second equation, change $\mathbf{x}_U$ and $\mathbf{x}_V$ to $\mathbf{y}_U$ and $\mathbf{y}_V$

177/16   Replace ϕ twice by η.

177/-7   Replace $\int_{\mathbf{x}} V...$ by $\int_{\partial \mathbf{x}} V....$

179/-16   The inequality $\geq$ should be $\leq$.

180/17   In the formula, replace $Z(p)$ by $U(p)$.

182/5   Should read: $\mathbf{x}(u,v) = v\alpha(a) + (1-v)\alpha(u)$.

187/-17   Replace "Exercise 9" by "Exercise 11".

190/5   In the formula, add subscripts thus: $p_3\mathbf{x}_u(p_1, p_2) + p_4\mathbf{x}_v(p_1, p_2)$.

Ch.5

202/7   Should read: From Exercise 1 of Section 1...

205/4   Should read: normal sections of C all....

217/13   Replace denominator du^2 by ∂u^2.

220/-1   Should read: $-1/b^2 \leq K < 0$.

221/1   Should read: The minimum value $K = -1/b^2$ occurs....

223/3   Change + to -, yielding $...-f_{uv}{}^2$.

224/9   Delete the parens "(" following the first $\pm$ and following "$\pm$ x".

225/-4   Should read: If β is a unit speed curve....

226/-9   In the formula for $K(u,v)$, square the entire denominator.

232/20   Should read: ...principal curvature k_i (not κ_i).

238/-16   The first row of the determinant should read: $a_2'^2$ $-a_1' a_2'$ $a_1'^2$.

240/middle   In Ex.14, add primes to α in (a) and to δ in (b).

241/-8   Delete the very difficult Ex.19.

242/-4   The denominator for N should be the same as the denominator for L.

244/11   Should read: The curve $y = c \cosh(x/c)$ (not v/c).

245/11   Should read: By Exercise 2.8   (not 2.10).

245/-3   Should read: ...are given in Exs. 5.5 and 6.15.

248/12   Should read: "As a shrinks down..." not "As c shrinks down...".

248/-6   Should read: $\sin(a*/c)$,   not $\sin(u*/c)$.

248/-5   Should read: $h(a*) = a \cos(a*/c) = ...$

Ch.6

269/5   Should read: Ex. 2.2(a), not Corollary 2.4.

270/9   Should read: Ex. 8.14, not Ex. 8.7.

270/-15   Should read: $M \subset \mathbf{R}^3$ (not $\mathbf{R}^2$).

286/12   Should read: Ex. 4.8   (not Ex. 4.7).

287/3   Should read: $\mathbf{x}(u,v)$ to $\mathbf{x}(u,v+\Delta v)$ is approximated by $\Delta v\, \mathbf{x}_v$.

289/9   Should read: ...one set $\mathbf{x}_i(R_i{}^o)$.

290/5   Should read: ...on any pair of tangent vectors to M is $\pm\|v \times w\|$.

291/7   Should read: area($\mathbf{x}_i(R_i)$).

294/-7   Should read: Example 7.1 of Chapter 5 (not Example 6.1).

294/-2   Delete du dv.

297/-12   Should read: $G^*(d\Sigma)(\mathbf{v},\mathbf{w}) = ...$

301/13   Change "Extend (b)" to "Extend (a)".

302/4   Should read: Ex. 7.6, not Ex. 7.8.

303/-13   Replace $x^2 + y^2$ in the numerator by $x^2 - y^2$.

Ch.7

313/2   The first subscript on this line should be "2", not "1".

314/11   The expression beneath the square root sign should be: $a_1'^2 + a_2'^2$.

314/middle   The speed in Ex. 2(a) is csc t, not r csc t.

315/11   Delete the "2" from the formula.

320/-1   In the integral, replace the denominator by: $1-(u/2)^2$.

326/10   Delete parens "(" before the first E_1 and before the first E_2.

328/19   Here J is the rotation operator defined in Ex. 1.3 of this chapter.

332/-9   Should read: ...where Ϋ denotes....

334/-1   Change sign ...$-G_v a_2'^2$ to $+G_v a_2'^2$.

345/1   Should read: ...$=\pm\cos^{-1}(c/u)$.

345/7   Replace **v** by **x**.

347/19   Should read "Poincaré."

351/-11   Should read: ...but $\kappa_g< 0$ for a (right-turning) clockwise trip.

351/-9   Replace "Lemma 4.6" by "Corollary 4.6".

354/5   Replace "of $\mathbf{x}_u$" by "of **x**".

364/-10   In (1), delete "no".

368/11   The first integral is over all of M, not just the polygonal region.

372/1   Should read: Figure 7.26, not Example 7.26.

Ch.8

375/14,17   Should read: *arc* length.

377/5   Should read: ...$\check{\delta}_v'(0) =\mathbf{v}$ (not $\check{\delta}_V(0)$).

379/-15   Should read $\exp_p$, not $\exp_v$.

380/-3   The expression under the square root should read: $a_1'^2+Ga_2'^2$.

384/4,5   Reletter (b)...(c) as (c)...(d).

385/2,3   (a) should read: "...to these geodesics." (b) should read: "...curves in (a)."

389/11   Delete the sentence: "Similarly,...."

389/-2   Should read: Section 7, not Section 6.

392/4   Should read: (u cos v, u sin v).

392/15   Should be the square root of G(π,v).

396/10   Should read: $g'(s)\geq 1$.

398/8   Should read: ...$+o(\varepsilon^3)$.

400/8   Should read: (Ch.4, Sec.2).

402/-2   The N should be an M tilde, as in the Proposition.

410/14   Should read: Hopf-Rinow theorem (2.1) (not (2.2)).

416/9   Should read: ...$x^2/\sqrt{2}$, $y^2/\sqrt{2}$, $z^2/\sqrt{2}$....

426/-14,-13   Replace larger by smaller and longer by shorter.

426/-6   Should be: $4\pi/k$.

Answers

451/1   Should read: 3. (a) y^3.

451/6   Use: $\alpha'(\pi/2)= (-1,0,1/\sqrt{2})$ at p=(1,1,$\sqrt{2}$).

453/4   Replace "...$2f^2$" by "...$2/f^2$".

458/5   Replace V=(x,0,z), which vanishes at the origin, by (1,0,y) and (0,1,x).

458/-12   The answer to Ex.5 has six subscripts: i,i,i,i,i,j. Change these to i,j,i,j,i,j.

459/-6   This line should begin "dual of curl V is dϕ".

463/9   Each *U* should be changed to *U'* (adding a prime).

464   In line 1, replace "(a)" by "(b)". In line 2, replace "Ex. 6.6" by "Ex. 7.6".

465/middle In the answer to Ex.1, the second omega should have subscripts "13".

466/-5   Change "(Ex. 7.8)" to "(Ex. 7.6, on p. 292)".

469/5   Replace $\omega_{13}(Y)E_3$ by $\omega_{12}(Y) E_3$, and subscript "y" by "Y".

474/-5   Change Lemma 7.3 to Lemma 7.4.

Index

481/24 (right col)   Should read: ...Surface of revolution,130, 241-250, not 234-242.

481/26 (left col)   Should read: ...Smooth disk, 185, (Ex.6), not Ex.5.

482/-1 (right col)   Add to "Winding number" references: 185 (Ex.6), 372(Ex.9)

Figures: On p. 35, replace Fig 1.14--a duplicate of Fig.1.13--by this figure.