

## Errata to Elements of Differential Topology

Special Asian Edition

Page No.	Line No.	How it appears	How it should be
1	9b	awhile we need...	a while we need...
2	2b	$\lim_{t \rightarrow t_0} \frac{(f(t) - f(t_0))}{t - t_0}$	$\lim_{t \rightarrow t_0} \frac{f(t) - f(t_0)}{t - t_0}$
5	5a	$\sum_i Df_i(x)\mathbf{e}_i$	$\sum_i D_i f(x)\mathbf{e}_i$
9	11a	... for $r \geq 1$ . It...	...for some $r \geq 1$ . It ...
10	10b	... Then $g_x$ ...	Then for $(x, y) \neq (0, 0)$ , $g_x$ ...
10	9b	... $xg + xyg_y$	... $xg + xyg_y$ , $(x, y) \neq (0, 0)$
11	7b	... $g_i$ on $V$ ...	... $g_i$ on $U$ ...
11	5b	... $\in V$ .	.... $\in U$ .
11	3b	$f(x) = \int_0^1 \frac{df(tx)}{dt} = \dots$	$f(x) - f(0) = \int_0^1 df(tx) = \dots$
12	21a	... $\sum_j$ ...	... $\sum_i$ ...
12	13b	...= $\alpha \operatorname{div} f + \alpha \cdot \nabla f$ , ...	...= $\alpha \operatorname{div} f + (\nabla \alpha) \cdot f$ , ...
12	12b	(c) $\operatorname{div}(f\nabla g)f\nabla^2 g + \dots$	(c) $\operatorname{div}(f\nabla g) = f\nabla^2 g + \dots$
16	2a	... functions of $f$ are ...	functions of $\sigma$ are ...
17	2a	... for $X = Id_n$ , ...	...for $X = I_n$ , ...
18	17a	... first order linear differential	...first order differential
18	28a	...for $m > n > n_0$	...for $m > n > n_0$
18	29a	$\leq \sum_k = m^m c^k < \epsilon$ .	$\leq d(x_1, x_0) \left( \sum_{k=n}^m c^k \right) < \epsilon$ .
18	32a	... $y_1 \in X$ is such that $\phi(y_1) = y_1$ , then	... $y_i \in X$ are such that $\phi(y_i) = y_i$ , then
19	8a	...Then $\hat{f} \in (E, \mathbb{R}^n)$ ...	...Then $\hat{f} \in C^1(R, \mathbb{R}^n)$ ...
20	3b	... $g(y) = \sqrt{w + \frac{1}{4}} - \frac{1}{2}$ .	... $g(y) = \sqrt{y + \frac{1}{4}} - \frac{1}{2}$ .
21	17a	...We have,	...We have:
21	18a	...for every $v \in \mathbb{R}^m$ , ...	...for every $\mathbf{v} \in \mathbb{R}^m$ , ...
22	9a	... $h(\mathbf{y}) = \mathbf{y}$ ...	... $h(\mathbf{y}) = \mathbf{y}$ ...
22	14a	...variables $\mathbf{y}$ near $\mathbf{b}$ ...	...variables $\mathbf{x}$ near $\mathbf{a}$ ...
22	14a	...variables $\mathbf{x}$ to obtain...	...variables $\mathbf{y}$ to obtain...
22	18a	...for $\mathbf{y}$ uniquely...	...for $\mathbf{x}$ uniquely...
22	24a	... $f \circ \phi$ ...	... $f \circ \phi$ ...
22	24a	...= $(x_1, \dots, x_n)$	... $(x_1, \dots, x_n)$ .
23	2a	...Let $U \subset \mathbb{R}^n$ ...	...Let $E \subset \mathbb{R}^n$ ...
23	3a	... $f \in C(U, \mathbb{R}^{n+m})$ ...	... $f \in C(E, \mathbb{R}^{n+m})$ ...
26	8a	...( $x+y$ , ...)	...( $x+y^2$ , ...)
27	13b	$\mathcal{L} := \mathcal{L}(x, \Lambda)$ ...	$\mathcal{L} := \mathcal{L}(x, y, \Lambda)$ ...
29	15b	...solutions being...	...solutions are...
30	5a	...of the the...	...of the ...
31	5b	$r^n \left( \frac{1}{n} \right)^{n/2}, \dots$	$(2r)^n \left( \frac{1}{n} \right)^{n/2}, \dots$
32	16b	...Therefore $\phi(\mathbb{R}^n) =$	...Therefore $\phi(\mathbb{R}^n \setminus 0) =$
32	5b	... $-\lambda \mathbf{x} \cdot \mathbf{x}$	... $-\lambda(\mathbf{x} \cdot \mathbf{x} - 1)$
34	14a	... on $X$ .	...on $X$ . A map $g : X \rightarrow \mathbb{R}^n$ is differentiable if each coordinate function $g_i : X \rightarrow \mathbb{R}$ is differentiable.
35	10a	which ... other.	and $f : U \rightarrow V$ be a diffeomorphism.
35	15a	(b) Since...here.	(b) Again for each $x \in U$ , $Df_x$ is invertible.
36	13b	...implies $x_n \neq 0$ ...	...implies $x_n \neq 1$ ...
36	8b	... $t\mathbf{y} + (1-t)N$ , ...	... $t\mathbf{y} + (1-t)N$ ,
36	7b	...yields $t^2 \sum_i y_i + (1-t)^2 \dots$	...yields $t^2 \sum_i y_i^2 + (1-t)^2 \dots$

Page No.	Line No.	How it appears	How it should be
44	23a	...function $g : \mathbb{R} \rightarrow \mathbb{R}$ ...	...function $f : \mathbb{R} \rightarrow \mathbb{R}$ ...
44	27a	... $\psi : (\alpha, \beta)$ ...	... $\psi : [\alpha, \beta]$ ...
45	10b	(i) $\frac{x^3y}{x^2-y^2}$	(i) $\frac{x^3y}{x^2+y^2}$
49	16	...Section 2.2 With...	...Section 2.2. With...
52	13b	...of subset of a space $X$ is defined to by...	...of a subset of a space $X$ is defined by...
56	10	...derivative of...	...derivatives of...
59	14a	Notice that for any...	Notice that any...
59	2b	...awhile.	...a while.
61	9a	...immediately. deduce...	...immediately deduce...
61	7b	...generate $\wedge V$ as...	...generate $\wedge V^*$ as...
63	2b	...anticommutative, algebra...	...anticommutative algebra...
66	3a	... $\Omega^k(X)$ ....	... $\Omega^p(X)$ ....
66	4a	... Each $\Omega^k(X)$ ...	... Each $\Omega^p(X)$ ...
70	7a	...front $j$ -face of ...	...front $j^{th}$ -face of ...
71	15b	...suffice	...suffices
71	6b	...and and ...	...and...
71	3b	...prove $\partial \circ = 0$ ,...	...prove $\partial \circ \partial = 0$ ,...
72	4a	... $\int_{I^n} f(x_1, \dots, x_n) dx_1 \cdots dx_n$ ...	... $\int_{I^n} f(x_1, \dots, x_n) dx_1 \cdots dx_n$ ...
72	8a	...= $\sum_i \int_{I^n} \dots$	...= $\sum_i n_i \int_{I^n} \dots$
77	17b	... called the dimension ...	... called the dimension...
77	15b	...choose a chart $x$ ...	...choose a chart $\phi$ ...
77	15b	... a local	...a local
78	7a	...anything...	...any integer...
78	12b	... $\phi_{\pm}$ ...	... $\eta_{\pm}$ ...
80	3a	...its own.	...its own. The codimension of $Y$ in $X$ is defined to be $\dim X - \dim Y$ .
85	7a	follows that that ...	follows that ...
87	17a	... $(-b, a, -d, c, -f, e, -h, g)$	... $(b, -a, d, -c, -f, e, -h, g)$ .
88	15a	...proved is the ...	proved the...
88	2b	...does not yield...	...does not yield...
89	4a	... $f^{-1}(x)$ ...	... $f^{-1}(y)$ ...
89	11a	... $f(\mathcal{R}_f) \subset Y$ ,...	... $f(\mathcal{R}_f) \subset Y$ ,...
89	12a	are all open.	are all open. (The last two assertions need $f$ to be proper.)
89	19a	... $Df_x$ .	... $Df_w$ .
90	12a	... $M(n, \mathbb{R}) : t(\det A)$ ...	... $M(n, \mathbb{R}) \times \mathbb{R} : t(\det A)$ ...
90	4b	...the maps $\phi_\alpha$ are given to by ...	...the map $\phi_\alpha$ is nothing but...
91	2a	...Steifel...	...Stiefel...
93	4a	$U_i = W_i \cap f^{-1}(V')$ ,...	$U_i = W_i \cap f^{-1}(V)$ ,...
106	2a	...an diffeomorphism	...a diffeomorphism
106	3a	...identity.	...identity and such that at $p = (2, 0, 0) \in \mathbb{M}$ , $\phi(p) = p$ and $d\phi_p$ is orientation reversing.
111	14a	...since $f$ ...	...since $\omega$ ...
111	14a	...such that $f$ ...	such that $\omega$ ...
112	11a	... $(-f(x_1, \dots, x_{n-1}, 0)$ ...	... $(-f(x_1, \dots, x_{n-1}, 0))$ ...
119	8a	...with a elementary...	...with an elementary...
119	14a	...Let $g(x)L(x) \cap \mathbb{S}^{n-1}$ ...	...Let $g(x) = L(x) \cap \mathbb{S}^{n-1}$ ...
121	11b	... Let $X$ be a ...	... Let $X \neq \emptyset$ be a ...
123	19	...each point of $x$ has...	...each point $x$ of $X$ has...
124	7b	replace $\varphi$ by $\psi$ in the diagram	
127	17b	... $\phi_i = f \circ \psi_i$ ....	... $\phi_i = \psi_i \circ f$ ....
130	17a	...be a fundamental...	...be fundamental...

Page No.	Line No.	How it appears	How it should be
130	1b	$\dots \lambda(t) = 1 + 1/2 - t.$	$\dots \lambda(t) = 1/2 - t.$
135	26a	$\dots \text{call it } U_1. \dots$	$\dots \text{call it } U_0. \dots$
135	39a	$\dots \text{such that } f_1(U_1) \subset (1, 2). \dots$	$\dots \text{such that } f_1 _{W_0} = f_0. \dots$
135	40a	$\dots \text{such that } f_k(U_k) \subset (k, k+1). \dots$	$\dots \text{such that } f_{+k} _{W_{k-1}} = f_{k-1}. \dots$
135	41a	$\dots \text{such that } f_{k+1} _{[0,k]} = f_{k-1} \dots$	$\dots \text{such that } f_{k+1} _{W_k} = f_k. \dots$
135	4b	$\dots \text{redefined}$	$\dots \text{redefine}$
135	3b	$\dots \text{obtaining} \dots$	$\dots \text{obtain} \dots$
136	6a	$\text{a map.} \dots$	$\text{a smooth map.} \dots$
137	7b	$\dots \text{lower and}$	$\dots \text{lower,}$
140	19a	$\dots \text{smooth manifolds, show} \dots$	$\dots \text{smooth manifolds without boundary, show} \dots$
145	15b	$\dots \text{Choose an atlas } \{(U_i, \phi_i)\}, \dots$	$\dots \text{Choose an atlas } \{(U_i, \phi_i)\}, \dots$
145	16a	$\dots \text{of } U_i. \text{ Since}$	$\dots \text{of } U_i. \text{ Now}$
148	14b	$(ii) \sup \ f(x) - g(x)\  < \epsilon.$	$\sup \ f(x) - g_k(x)\  < \epsilon, \text{ on } X.$
148	9b	$\sup \ f(x) - g(x)\  < \epsilon.$	$\sup \ f(x) - g(x)\  \leq \epsilon.$
148	8b	$\text{Taking } g_0 = f, \dots$	$\text{Taking } g_0 = f, \dots$
149	16b	$\text{the above proof}, \dots$	$\text{in the above proof}, \dots$
151	17b	$\dots \text{the Steifel} \dots$	$\dots \text{the Stiefel} \dots$
154			Delete lines 2-5
155	3b	$\dots \alpha : X \rightarrow \mathbb{R}^N \dots$	$\dots \alpha : N(X) \rightarrow \mathbb{R}^N \dots$
155	1b	$T_{(x,\mathbf{v})} \dots$	$T_{(x,\mathbf{v})} \dots$
156	9a	$\dots (y, \mathbf{v}) \in N(M) \dots$	$\dots (y, \mathbf{v}) \in N(X) \dots$
156	11a	$\dots \text{suitable a choice} \dots$	$\dots \text{a suitable choice} \dots$
158	4a	$\text{tangent spaces of } N \dots$	$\text{tangent spaces of } Y \dots$
160	1b	$\dots \text{vector filed}..$	$\dots \text{vector field}..$
162	27a	$\dots \text{and an } \sigma \dots$	$\text{and } \sigma \dots$
163	22a	$\text{Check that } h(f(x), t) \dots$	$\text{Check that } H(f(x), t) \dots$
166	3a	$\dots \text{manifold } N. \text{ Let}$	$\dots \text{manifold } N, \text{ i.e., } N \text{ is compact and } \partial N = \emptyset. \text{ Let} \dots$
166	9a	$\text{vector field} \sigma \dots$	$\text{vector field } \sigma \dots$
166	7b	$\dots \text{ of manifold}$	$\dots \text{of a manifold}$
167	17a	$\dots \text{join } \phi(a_k) \dots$	$\dots \text{join } \psi(a_k) \dots$
168	21a	$\dots \text{in the above proof works.}$	$\dots \text{in the proof of lemma 6.3.1 works.}$
170	17b	$\dots \text{matrices in (ii).} \dots$	$\dots \text{matrices in (b).} \dots$
173	11a	$\dots \text{closed subspaces.} \dots$	$\dots \text{compact submanifolds.} \dots$
173	12a	$\dots M_1 \text{ and } M_2 \dots$	$\dots X_1 \text{ and } X_2 \dots$
178	21b	$\dots F(x, 0) = x, x \in X, \text{ and} \dots$	$\dots F(x, 0) = x \text{ and} \dots$
179	23b	$\dots \mu : X \times B^n \rightarrow B^n \text{ given} \dots$	$\dots \mu : X \times B^n \rightarrow B^n \text{ is given} \dots$
181	8b	$\dots \text{and a point a regular value} \dots$	$\dots \text{and a regular value} \dots$
182	11a	$\dots \text{define deg } f \text{ as} \dots$	$\dots \text{define deg } f \text{ to be} \dots$
183	1b	$\dots \text{seen that the rmdeg } Q \dots$	$\dots \text{seen that the rmdeg } \eta_n \dots$
184	12b	$\dots \text{Thus, the latter map} \dots$	$\dots \text{Thus } z \mapsto H(z, 1) \dots$
191	2b	$\dots \text{embeddings. And} \dots$	$\dots \text{embeddings (see Definition 5.2.4 and Remark 5.2.1).}$
191	8b	$\dots \text{embedding } X \text{ this} \dots$	$\dots \text{embedding of } X, \text{ this} \dots$
191	2b	$\dots \text{Schoenfly-}$	$\dots \text{Schoenflies}$
193	7a	$\dots \text{contradicting (2).}$	$\dots \text{contradicting(k2).}$
193	9a	$\dots \text{contradicts (3).}$	$\dots \text{contradicts (k3).}$
194	14a	$\dots A_1, A_2, A_3 \dots$	$\dots A_1, A_2, A_3 \dots$
196	11a	$\dots \text{points of spheres.} \dots$	$\dots \text{points of balls.} \dots$
197	15b	$\dots \text{is denote} \dots$	$\dots \text{is denoted} \dots$
197	13b	$I(X) := L(Id_X) = \dots$	$I(X) := L(Id_X) = \dots$
199	6b	$\dots \text{This phenomenon} \dots$	$\dots \text{(This phenomenon} \dots$
200	(6+7)a		DELETE THEM
200	8a	$\dots \text{by Taylor's Theorem} \dots$	$\dots \text{by Taylor's Theorem} \dots$

Page No.	Line No.	How it appears	How it should be
203	18a	Reverse the arrows on the circles on the right side in (Vii)	
203	6b	...1, 1, -1, 1, -1, 1, 2.	1, 1, -1, 1, 1, 1, 2.
203	(6+7)b	DELETE the text 'ARE YOU...index?'	
209	9b	...functions...1925. He...	...function of $n$ independent variables' in Trans. Amer. Math. Soc.(1925) no.3, 345-394. He...
212	2b	... $g \circ \phi$ ...	... $f \circ \phi$ ...
213	7a	...map $d\pi_p = \pi$ ...	...map $D\pi_p = \pi$ ...
215	19b	...+ $\sum_{i,j < n} \sigma_{ij}(\mathbf{y}) y_i y_j$ ,	...+ $\sum_{i,j < n} \rho_{ij}(\mathbf{y}) y_i y_j$ ,
215	18b	...functions $\sigma_{ij}$ ...	...functions $\rho_{ij}$ ...
215	17b	...matrix $((\sigma_{ij}(0))$ ...	...matrix $(\rho + ij(0))$ ...
220	14b	Replace the entire line with $\alpha : \mathbb{D}^n \setminus (S^{k-1} \cup 0 \times \mathbb{D}^{n-k}) \rightarrow \mathbb{D}^n \setminus (S^{k-1} \cup 0 \times \mathbb{D}^{n-k})$ <i>sphere</i> $h(S^{k-1})$ "...	<i>sphere</i> $f(S^{k-1})$ "...
220	5b	restricted to $M \setminus S^{k-1}$ ...	restricted $M \setminus f(S^{k-1})$ ...
223	25a	...which homeomorphic...	...which is homeomorphic...
223	1b	...Exercise 8.2.(vii)-(viii) comes...	...Exercise 8.2.1.(vii)-(viii) come...
225	7b	... a CW-complex...	a finite CW complex...
228	12a	$\mathbb{S}^{n-1}$ and $M$ .	$\mathbb{S}^n$ and $M$ .
228	9b	... $M_\epsilon$ .	... $M_{c-\epsilon}$ .
231	15a	..definition $\alpha$ .]	..definition of $\alpha$ .]
233	2a	...only minimum	...onlu maximum
233	3a	...only maximum for...	...only minimum for...
233	5a	... $f_1(p_1) + \sum_i$ ...	... $f_1(p_1) - \sum_i$ ...
233	8a	... $c = f_1(p_1) + 1 - f_2(p_2)$ ...	... $c = f_1(p_1) - 1 - f_2(p_2)$ ...
233	14a	...= $e(f_1) + e(f_2) + \alpha(n)$ .	...= $e(f_1) + e(f_2) + a(n)$ .
237	9a	(see example 7.8.4,...	(see example 7.8.4),...
238	19a	... $[-\pi/2, 3\pi/2] \times [0, 2\pi]$ ...	$[-\pi/2, 3\pi/2] \times [-\pi/2, 3\pi/2]$ ...
238	23a	...hence a smooth...	...hence defines a smooth...
239	4b	...connected of $\hat{W}'$ ...	...connected sum of $\hat{W}'$ ...
242	15a	...try prove...	...try to prove...
242	9b	is has...	has...
244	2b	...rotation $A_p$ ...	...rotation of $A_p$ ...
245	7a	...of $\mathbb{K}$ .	... over $\mathbb{K}$ .
245	14b	...iff $R_A \in \dots$	...iff $R_A \in \dots$
250	5b	... an neighborhood ...	...a neighborhood...
251	20a	$(\mathbf{u}, \mathbf{v}) \mapsto t \mathbf{u} A^* \mathbf{v}$ ,	$(\mathbf{u}, \mathbf{v}) \mapsto \mathbf{u} A^* \mathbf{v}$ ,
251	13b	$A$ is positive...	A Hermitian matrix $A$ is positive...
252	19a	... Corollary...smooth.	...Corollary 9.1.3. It follows that the assignment $A \mapsto (U, H)$ is smooth.
253	13a	...exists neighborhood...	exist nieghborhoods...
253	14a	... $x \in G$ ...neighborhood...	$x \in G$ and $U$ as above, there is a neighborhood...
258	4b	... $\mu(t, e) = e$ ,...	... $\mu(t, e) = t$ ,...
260	7b	Repalce the line with $\mathcal{O}(n)/\mathcal{O}(l_1) \times \dots \times \mathcal{O}(l_r) \times \mathcal{O}(l_{r+1})$	where $l_1 = k_1, k_i = k_i - k_{i-1}, i \geq 2$ .
263	17b	... $GL(\mathbb{K})$ ,...	... $GL(n, \mathbb{K})$ ...
269	8b	... $x_i(g)x_j(h)$ .	... $x_j(g)x_k(h)$ .
269	7b	... $x_i(g)x_j(h)$ .	... $x_j(g)x_k(h)$ .
269	4b	... $x_i(gh)x_j(h^{-1}g^{-1}hg)$ ...	... $x_j(gh)x_k(h^{-1}g^{-1}hg)$ ...
270	11a	$= \lim_{t \rightarrow 0} \frac{x_i(t\mathbf{u})}{t}$	$= \lim_{t \rightarrow 0} \frac{x_i(t\mathbf{u}) + [t\mathbf{u}, \mathbf{v}](x_i)(e)}{t}$
279	13b	...submersion $f : M \rightarrow N$ ...	...submersion $f : X \rightarrow Y$ ...
281	4b	...foliated manifold $M$ .	...foliated manifold $X$ .
287	11a	Apply Roll's...	Apply Rolle's...
289		Replace lines 7b,6b, by the following $(d, c, -b, -a, h, g, -f, -e); (e, f, -g, -h, -a, -b, c, d);$ $(f, -e, h, -g, b, -a.d, -c); (g, h, e, f, -c, -d, -a, -b); (h, -g, -f, e, -d, c, b, -a)$	
302	17b	...Mich. Math. J. 7(160),...	Mich. Math. J. 7 (1960),...
307	11b	Steifel manifolds	Stiefel manifolds