Correction to: Convex Analysis and Monotone Operator Theory in Hilbert Spaces

Correction to:
H.H. Bauschke, P.L. Combettes,
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The original version of this book was inadvertently published without updating the following corrections in Chapters 1–3, 5–13, 16–20, 23, 24, 26, 29, 30, and back matter. These are corrected now.

The updated version of this book can be found at
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For **Figures 8.1, 13.1, 16.1, 18.1, 20.1, and 26.1**—The usage of font/Symbol $\mathcal{H}$ invariably differs from universally adhered display standards throughout the text content and the same has been incorporated to resolve the issue.

1 **Second line after Eq. (1.55):** The identity $\operatorname{diam} B(x_n; \varepsilon_n) = 2\varepsilon_n$ has been replaced by $\operatorname{diam} B(x_n; \varepsilon_n) \leqslant 2\varepsilon_n$.

2 **Second line after Eq. (2.17):** $n \times n$ has been replaced by $N \times N$.

3 **Fact 2.63:** The assumption:
let V be a neighborhood of Tx, and let $R\colon V \to \mathcal{K}$. Suppose that R is Fréchet differentiable at x and that T is Gâteaux differentiable at Tx

has been replaced by:

let V be a neighborhood of Tx such that $T(U) \subset V$, and let $R\colon V \to \mathcal{K}$. Suppose that T is Gâteaux differentiable at x and that R is Fréchet differentiable at Tx

4 **Exercise 3.2:** The phase “a nonempty set” has been replaced by “a nonempty finite set”.

5 **First line of Exercise 5.9:** The phrase “Let m be a strictly positive integer” has been replaced by “Let $m \geqslant 2$ be an integer”

6 **Second line after Eq. (6.3):** The expression $\sum_{i \in I} \alpha_i = 1$ has been replaced by $\sum_{i \in I} \alpha_i \leqslant 1$.

7 **Example 7.10:** The assumption “Suppose that $\mathcal{H}$ is finite-dimensional” has been added.

8 **Proof of Proposition 8.14(i):** The phrase “the convexity of ϕ on C” has been replaced by “the convexity of ϕ on I”.

9 **Example 8.33, last line of the proof:** The phrase “so is $\phi = f(\cdot, 1)$” has been replaced by “so is $\phi^\diamond = f(\cdot, 1)$”

10 **Exercise 8.12(ii):** The expression $|x^{1/p} + 1|^p$ has been replaced by $-|x^{1/p} + 1|^p$

11 **Exercise 8.19:** The expression $0 \in C$ has been replaced by $0 \in \operatorname{ri} C$.

12 **Equation (9.39):** $\mu(\omega)$ has been replaced by $\mu(\Omega)$

13 **Right-hand side of Equation (9.40):** $\mu(\omega)$ has been replaced by $\mu(\Omega)$

14 **Proposition 11.8(ii):** The expression $C \cap \operatorname{Argmin} f$ has been replaced by $(\operatorname{int} C) \cap \operatorname{Argmin} f$.

15 **Definition 12.34:** The phrase "it is exact at a point $y \in \mathcal{H}$" has been replaced by "it is exact at a point $y \in \mathcal{K}$"

16 **Exercise 13.4, Equation (13.39):** The expression $\frac{1}{2}u^2 - |u| - \frac{1}{2}$ has been replaced by $\frac{1}{2}u^2 + |u| - \frac{1}{2}$.

17 **Proposition 13.24 and Corollary 13.25:** The assumption "Let $\mathcal{K}$ be a real Hilbert space"has been added.

18 **Proof of Proposition 13.45:** The phrase "in view of Proposition 13.13" has been removed.

19 **In Eq. (13.26):** The expression $\sup_{x_i \in \mathcal{H}}$ has been replaced by $\sup_{x_i \in \mathcal{H}_i}$.

20 **Equation (17.45):** The expression $N_C x \cap B\big(0; \phi'(d_C(x))\big)$ has been replaced by $N_C x \cap B\big(0; \phi'(0)\big)$.

21 **Corollary 18.20, first sum in Eq. (18.40):** The expression $\sum_{i=1}^{m} \alpha_i \operatorname{Prox}_{f_i}$ has been replaced by $\sum_{i \in I} \alpha_i \operatorname{Prox}_{f_i}$

22 **Fourth line after Eq. (18.40):** The expression $\nabla f = \sum_{i \in \mathcal{H}} \alpha_i \operatorname{Prox}_{f_i}$ has been replaced by $\nabla f = \sum_{i \in I} \alpha_i \operatorname{Prox}_{f_i}$.

23 **Exercise 20.1(iii):** The phrase "is differentiable" has been replaced by "is convex and differentiable".

24 **Equation (24.81):** The expression

$$\xi \mapsto \begin{cases} \xi \operatorname{arctanh}^{-1}(\xi) + \dfrac{1}{2}\Big(\ln\big(1-\xi^2\big) - \xi^2\Big), & \text{if } |\xi| < 1; \\ +\infty, & \text{if } |\xi| \geqslant 1. \end{cases}$$

has been replaced by

$$\xi \mapsto \begin{cases} \dfrac{(1+\xi)\ln(1+\xi) + (1-\xi)\ln(1-\xi) - \xi^2}{2}, & \text{if } |\xi| < 1; \\ \ln(2) - 1/2, & \text{if } |\xi| = 1; \\ +\infty, & \text{if } |\xi| > 1. \end{cases}$$

25 **Example 24.51:** The expression "is a proximal thresholder" has been replaced by "If $\mathcal{H} = \mathbb{R}$, then Prox_f is a proximal thresholder".

26 **Exercise 24.6:** The phrase "Show that $(\forall x \in \mathcal{H})$" has been replaced by "Show that $(\forall x \in \mathbb{R})$"

27 **Corollary 26.6: The statement:**

Then $x \in \operatorname{zer}(A + B)$, $u \in \operatorname{zer}(-A^{-1} \circ (-\mathrm{Id}) + B^{-1})$, $(x, -u) \in \operatorname{gra} A$, and $(x, u) \in \operatorname{gra} B$

has been replaced by:

Then $x \in \operatorname{zer}(A + B)$, $-u \in \operatorname{zer}(-A^{-1} \circ (-\mathrm{Id}) + B^{-1})$, $(x, u) \in \operatorname{gra} A$, and $(x, -u) \in \operatorname{gra} B$

28 **Theorem 26.34, line after Eq. (26.97):** The inclusion $\gamma \in \left]0, 1/\|L\|^2\right[$ has been replaced by $\gamma \in \left]0, 1/\|L\|\right[$

29 **Statement of Proposition 29.4:** The identity $\boldsymbol{C} = \times_{i \in I} C_i$ has been replaced by $\boldsymbol{C} = \boldsymbol{\mathcal{H}} \cap \times_{i \in I} C_i$

30 **Exercise 29.23:** The statement "Show that $(\forall x \in \operatorname{dom} f \smallsetminus C)$" has been replaced by "Show that $(\forall x \in \operatorname{dom} f \smallsetminus C)$ $d_C(x) \leqslant \|x - x_0\|(f(x) - \xi)/(f(x) - f(x_0))$."

31 **Example 29.47:** The expression $C = \operatorname{lev}_{\leqslant 0} f = \left]-\infty, -1/2\right]$ has been replaced by $C = \operatorname{lev}_{\leqslant 0} f = \left]-\infty, -1\right]$.

32 **Equation (30.8) and the sentence before:**

and therefore that

$$(x_{n+1} - Tx_n)_{n \in \mathbb{N}} \text{ is bounded.}$$

has been replaced by

and therefore, in view of (i), that

$$\|x_{n+1} - Tx_n\| = \lambda_n \|x - Tx_n\| \to 0.$$