Functional Analysis (corrected printing)

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Errata and Corrigenda (last update: February 16, 2024)

This list takes the corrected printing of the book (which went online on the CUP website on Sept. 7, 2023, and corresponds to arXiv version 5) as the point of departure. *Page and line numbers refer to this version of the book*. A version where all corrections have been done is downloadable by clicking on the book cover icon on the author's webpage.

Errata

page 81, Problem 2.23: In the statement of the problem, '$1 \leqslant p \leqslant \infty$' should read '$1 < p \leqslant \infty$', in part (b) one should delete 'for $p = 1$ we have', and part (c) is meant to read 'Do we also have $\lim_{n\to\infty} f_n = f$ in $L^p(\Omega)$?'.

page 262, line 12: the equality '$\|Tx\|^{2k} = \|T^k x\|^2$' should read '$\|T\|^{2k} = \|T^k\|^2 = \sup_{\|x\|\leqslant 1} \|T^k x\|^2$'. The argument can be completed as stated, inserting suprema in front of every term in the displayed estimates.

page 508, Example 14.3: The assumption should be added that $L^2(\Omega,\mu)$ be separable.

page 510, Theorem 14.8: The assumption should be added that μ be σ-finite.

Typos and other trivia

page 11, line 7: replace 'Tx'' by '$T'x$';
lines 10 and 13: replace '$T+T$' by '$T+T'$'.

page 17, line 4: replace '$d(s,t)+d(s',t')$' by '$d(s,s')+d(t,t')$';
line 16: replace '$\leqslant \mu(K)\|f\|_\infty$' by '$\leqslant \mu(K)\|k\|_\infty$'.

page 20, line 4: delete 'a'.

page 42, line 4: after 'is' add 'a';
line 6: replace '$u : [0,T] \to \mathbb{K}$' by '$u : [0,T] \to \mathbb{K}^d$'.

page 43, line 8: a closing bracket is missing.

page 46, line -9: replace '2^{n-1}' by '$2^n - 1$'.

page 47, line -4: replace 'there is set' by 'there is a set'.

page 49, line 5: replace 'classes' by 'class';
line -5: replace 'If' by 'It'.

page 58, line 5: omit the 5th '$\|$'.

page 88, line -3: replace '$\overline{(x|y)}$' by '$(x|y)$'.

page 90, line -11: replace 'a norm' by 'an inner product'.

page 96, line -1: replace 'is' by 'in'.

page 98, line 4: delete 'with $i \neq j$'.

page 117, line 2: replace ‘in ℓ^q’ by ‘$\xi \in \ell^q$’;
line 3: replace ‘$\|\xi\|_p$’ by ‘$\|\xi\|_q$’.
page 119, line 10: replace ‘g’ by ‘f’ twice.
page 133, line 6: replace ‘$x_0 \in X$’ by ‘$x_0 \in X_0$’.
page 135, lines -3 and -4: replace ‘$f(t)$’ by ‘$f'(t)$’ three times.
page 139, in part (2) of Proposition 4.27, replace ‘$i : X \to Y$’ by ‘$i : Y \to X$’.
page 142, line -1: after ‘from it’ add ‘by’.
page 151, line -14: replace ‘of X’ by ‘of X^*’.
page 176, line 8: replace ‘of the closed graph theorem’ by ‘of the preceding corollary’
line -6: after ‘is closed’ add ‘in’.
page 204, line -6: replace ‘part (b)’ by ‘part (a)’.
page 207, line 5: replace ‘$f(\cdot + 2\pi)$’ by ‘$f(\cdot + n)$’.
page 209, line -6: replace ‘will remain force’ by ‘will remain in force’.
page 212, line 1: replace ‘$\lambda > \|T\|$’ by ‘$|\lambda| > \|T\|$’.
page 217, line -9: replace ‘Section 1.1’ by ‘Section 1.5.a’.
page 219, line 1: in the caption to Figure 6.1, replace ‘$K_1 \cup \Gamma_2$’ by ‘$K_1 \cup K_2$’.
page 220, line -3: replace ‘$h_\lambda(T)$’ by ‘$h(T)$’.
page 221, lines 8 and 10: replace ‘$h_\lambda(T)$’ by ‘$h_\mu(T)$’ (three times).
page 224, Problem 6.4: replace ‘T_{r}’ by ‘T’.
page 229, line -2: in the displayed formula, replace ‘$\mathbf{1}_{B_j}$’ by ‘$\mathbf{1}_{B_j} \otimes \mathbf{1}_{B_j}$’ (the rank one operator sending f to $(f|\mathbf{1}_{B_j})\mathbf{1}_{B_j}$).
page 230, line -14: replace ‘$(T^* y_n^*)_{j \geqslant 1}$’ by ‘$(T^* y_n^*)_{n \geqslant 1}$’.
page 234, line -5: replace ‘i It’ by ‘it’.
page 239, line 8: in Example 7.21(i), replace ‘$\mathrm{ind}(T) = 0$’ by ‘$\mathrm{ind}(I - T) = 0$’.
page 256, line 10: replace ‘$x \in X$’ by ‘$x \in H$’;
line -6: replace ‘analogous’ by ‘analogues’.
page 261, line 8: replace ‘7.4’ by ‘7.7’;
line -2: replace ‘A operator’ by ‘An operator’.
page 263, line 6: replace ‘$x \in X$’ by ‘$x \in H$’;
line 13: replace ‘If Y be’ by ‘If Y is’.
page 282, line 2: after ‘properties’ add ‘of’.
page 291, line -1: replace ‘$x \in X$’ by ‘$x \in H$’.
page 304, line -5: replace ‘$x \in X$’ by ‘$x \in H$’.
page 315, line -9: replace ‘an’ by ‘a’.
page 313, line 3: replace ‘$\mathsf{D}(A)$’ by ‘$\mathsf{G}(A)$’.
page 316, line 3: replace ‘an’ by ‘a’.
page 321, line 4: replace ‘$\frac{\delta}{1-\delta}$’ by ‘$\frac{1}{1-\delta}$’.
page 359, line 8: replace ‘an’ by ‘a’.
page 390, Problem 11.2: in the Hint, replace ‘$f(y)$’ by ‘$f'(y)$’.
page 432, line -12: in the third expression, remove the first ‘$\frac{1}{h}$’.
page 434, line -4: replace ‘strong convergence on compact sets’ by ‘uniform convergence on compact sets’.
page 435, lines -12 and -11: replace ‘e^{ht}’ by ‘$e^{\lambda h}$’ twice.
page 438, line 13: replace ‘$S_(t)$’ by ‘$S_-(t)$’.
page 511, line -10: singular values are defined on the next page.
page 544, line -10: replace ‘$B = \mathscr{X}$’ by ‘$B = X$’.
page 558, line 17: remove the word ‘identify’ (which occurs twice in this sentence).

page 578, line 12: remove the bracket in '$\bar{c}x)$'.
page 631, line -14: replace 'for S' by 'for F'.
page 641, line -9: after 'if and only' add 'if', and replace '$s' \in S$' by '$s' \in S'$'.
page 642, line -16; replace 'very complete sets S' by 'Every complete set S'.
page 643, line 3: a dot is missing;
line -6: replace '$i' \lim_{n\to\infty} x_n$' by '$\lim_{n\to\infty} i' x_n$'.
page 659, the presentation of Borel measures on metric spaces has been streamlined a bit.

Addenda

page 174, The 'if' part of Proposition 5.5 admits the following more direct proof. Suppose that S is weakly bounded. For each $x \in S$, the mapping $T_x : x^* \mapsto \langle x, x^* \rangle$ is bounded, with $\|T_x\| = \sup_{\|x^*\| \leqslant 1} |\langle x, x^* \rangle| = \|x\|$. By assumption, for each $x^* \in X^*$ we have $\sup_{x \in S} |T_x x^*| < \infty$. Therefore, the uniform boundedness theorem (which can be applied since X^* is a Banach space) implies that $\sup_{x \in S} \|x\| = \sup_{x \in S} \|T_x\| < \infty$. One may also observe that in Corollary 5.6, completeness of X is only needed in part (1).

page 212, Proof of Lemma 6.7: conclude by taking $U = (\mu - \lambda)I$ and $S = \lambda - T$.

page 229, Example 7.7: In Example 14.3 it will be shown, under the weaker assumption that the measure space (K, μ) be σ-finite, that the integral operator T defined as in this example is shown to be Hilbert–Schmidt. By Proposition 14.5, this property implies compactness. The separability of $L^2(K, \mu)$ required for this follows from Remark 2.31 (and an approximation argument to pass from finite to σ-finite measures).

page 259, Theorem 8.11: A short alternative proof of the spectral inclusion $\sigma(T) \subseteq \mathbb{R}$ is obtained by combining Propositions 8.4 and 8.10 with the spectral mapping theorem: since T is selfadjoint, the operator e^{iT} is unitary; consequently, $\sigma(e^{iT}) = e^{i\sigma(T)}$ is contained in the unit circle and therefore $\sigma(T)$ must be real. (Yet another proof, also based on Proposition 8.10, is outlined in Problem 8.3.)