# CORRECTIONS TO A COMPANION

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This first correction page is based on a long and insightful lists from Bob Burckel and Eric Løw. I should also like to thank Marit Sandstad, Norton Starr, Wan-Teh Chang, Silas Davis, Vito Videtta, Daniel Worrall Daniel James, Eliya Gwetta, Johan Grundberg, Robin Chapman, Ben Bullock and Kassra Rashidian for contributions.

*Page 13* End of first paragraph. Replace (P4) by (P3).

*Page 14* Exercise 1.34, parts (iii) and (iv), final formula $g(x) = t$.

*Page 18* In Theorem 1.42 we do not need the assumption $K \geq 0$.

*page 32* In proof of Lemma 3.4 first $(ii')$ should be $(i')$.

*page 39* 'religion the University of Prague' should be 'religion at the University of Prague'.

*Page 45* [A clarification rather than a correction] In Exercise 4.5, (ii), line 2 'positive' for us means 'non-negative'.

*Page 47* In Exercise 4.11 (ii) replace + by − to get

$$\|\mathbf{x} + \mathbf{y}\|^2 - \|\mathbf{x} - \mathbf{y}\|^2.$$

*Page 49* In Exercise 4.17 (i) replace 'closed' by 'bounded'.

*Page 52* In Exercise 4.27 (iii) replace the self referential (iii) by (ii).

*Page 52* In Exercise 4.27 (iv) $\bigcap_{j=1}^{\infty} F_j$ should be $\bigcup_{j=1}^{\infty} F_j$.

*Page 55* Line 3, replace $f(\mathbf{x})$ by $f(\mathbf{y})$

*Page 55* In Exercise 4.36 replace 'Lemma 4.29' by 'Exercise 4.29'.

*Page 69* In Exercise 4.79 (iii) next to last line, replace 'to to' by 'to'.

*Page 73* First line of Exercise 5.3 (i). $|a_{n+1}/a_n| < (1 + |l|)/2$.

*Page 75* Exercise 5.9 (iii) 'inequality of Exercise 5.7 (i)' (not Exercise 5.7 (ii)).

*Page 84* First two lines of proof. Replace $X_k$ by $E_k$ and $X$ by $E$.

*Page 85* In line 6, Theorem 5.26 should be Lemma 5.26.

*Page 107* In line 21, the second $A$ should be $A'$. In line 22 the first $A'$ should be $A$.

*Pages 108 and 453* 'Pierce' should be 'Peirce'.

*Page 116* Line 6, $\mathcal{L}$ should be $\mathbb{L}$. Line 8, should say that $\Re z$ is the real part of $z$. In part (v) we must specify that $\mathbb{K}$ is closed under conjugation (ie $z \in \mathbb{K}$ implies $z^* \in \mathbb{K}$).

*Page 118* Second last line of second last paragraph. Replace $h \to x$ by $h \to 0$.

*Page 121* First formula, second paragraph of part (ii)

$$(\alpha_1 - \alpha_2)\mathbf{h} = \boldsymbol{\epsilon}(\mathbf{h})\|\mathbf{h}\|$$

*Page 142* Line 2 should end '$= 0$'.

*Page 148* Since $f$ maps to $\mathbb{R}$ we have $\epsilon(\mathbf{h}) \in \mathbb{R}$ and on line -4 should have $|\epsilon(\mathbf{h})|$ rather than $\|\epsilon(\mathbf{h})\|$.

*Page 152* Last line of Exercise 7.27 replace 'withot' by 'without'.

*Page 152* Exercise 7.30 Replace $g(-\theta) = -g(\theta)$ by $g(\pi+\theta) = -g(\theta)$.

*Page 161* Line $-3$ Replace $i = 1$ by $j = 1$ twice (once in sum, once in union).

*Page 163* [A clarification rather than a correction] Last line but one of Exercise 8.4, 'whatever we assume' can be replaced by 'whatever we assume about $|E|$'.

*Page 163* Exercise 8.5. Replace $E_q$ by $E_j$.

*Page 163* Exercise 8.7 (a) 'a volume' rather than 'an volume'.

*Page 167* Pair of displayed inequalities towards end of page are garbled. Should read

Using this and corresponding results, we obtain

$$I(f) + \epsilon/4 > S(f, \mathcal{D}) \geq s(f, \mathcal{D}) > I(f) - \epsilon/4,$$
$$I(g) + \epsilon/4 > S(g, \mathcal{D}) \geq s(g, \mathcal{D}) > I(g) - \epsilon/4.$$

*Page 170* Exercise 8.21 (ii) comma missing. $s(f^2 D)$ should be $s(f^2, D)$.

*Page 170* Exercise 8.23. Second line replace Exercise 8.17 by Exercise 8.21.

*Page 172* Exercise 8.29 (ii) is wrong as it stands. We need $f$ to be continuous. Replace by 'Show that if $f : [a, b] \to \mathbb{R}$ is continuous with only a finite number of local maxima and minima then ...'.

*Page 184* Exercise 8.59, beginning of second paragraph '$g : [a, b] \times [c, d] \to \mathbb{R}$'.

*Page 203* Exercise 9.22. Interchange $dx$ and $dy$ in the middle integral.

*Page 218* Last paragraph should (I hope) read:-

By observing that $WA = XZ$, or otherwise, show that the area of the triangle $AXD$ is $m^{-1} \sin\big(\pi/(2n)\big)$. Show that $YW$ has length $2(\sin(\pi/2n))^2$ and deduce, or prove otherwise, that the triangle $XAB$ has area given by $\sin(\pi/n)\big((2m)^{-2} + 4(\sin(\pi/2n))^4\big)$. Conclude that

$$A(m, n) = 2n \sin\frac{\pi}{2n} + n \sin(\pi/n)\left(1 + 16m^2\left(\sin\frac{\pi}{2n}\right)^4\right)^{1/2}.$$

*Page 223* Third line add question mark: wherever we can'?

*Page 226* Lemma 10.7 (i) minus sign needed. $\log_e N! = N \log_e N - N + \theta(N)N$

*Page 227* First sentence of part (ii)of the proof should read 'In what follows we shall be replacing an integer $m$ by a real number $y$ with $|m - y| \leq 1$.'

*Page 227* Exercise 10.8 (v) $H(t) \to 0$ as $t \to 0$ through positive values.

*Page 228* Paragraph following Exercise 10.10 Middle sentence should start 'Since the remaining $\mathbf{y}_j$ with $2 \leq j \leq N$ have been chosen at random, independently of $\mathbf{y}_1$'

*Page 234* Exercise 10.40 (ii). Wrong as it stands. Set $d_2(x, y) = d(x, y)^{1/2}$.

*Page 235* Exercise 10.44 (ii). Replace 'between metric spaces' by 'between metrics on a space $X$.'

*Page 238* Exercise 10.51. Last displayed formula. Replace $P'$ by $P''$.

*Page 240* Exercise 10.56: Properties (iv) to (vii) should be relabelled as (iii) to (vi).

*Page 280* In proof of Lemma 11.80 Replace '$r_\alpha(0) = 1$' by '$r_\alpha(1) = 1$'

*Page 281* Displayed formula in Exercise 11.83 (ii) should have even exponents to give

$$1 + \frac{1}{2}\left(\frac{2x}{1+x^2}\right)^2 + \frac{1}{2} \times \frac{3}{4}\left(\frac{2x}{1+x^2}\right)^4 + \frac{1}{2} \times \frac{3}{4} \times \frac{5}{6}\left(\frac{2x}{1+x^2}\right)^6 + \dots$$

*Page 282* Exercise 11.85, last line: Question, so '?'.

*Page 292* Exercise 12.1, last line 'whenever $a \leq 0 \leq b$.'

*Page 300* In Exercise 12.25(i), the initial condition is '$e(0) = 1$' (not '$e(0) = 0$').

*Page 302* Last paragraph. 'Here, as usual, $y(s+) = \lim_{t \to s,\ t>s} y(t)$ and $y(s-) = \lim_{t \to s,\ t<s} y(t)$.'

*Page 302* Last paragraph. $\delta_c$ should be $\delta_s$ and 'a unit impulse at $c$' should be 'a unit impulse at $s$'.

*Page 303* Replace '$y_1'(s)y_2(s) - y_1(s)y_2'(s)$' twice by '$y_1(s)y_2'(s) - y_1'(s)y_2(s)$'. In Definition 12.27, replace '$u_1'(s)u_2(s) - u_1(s)u_2'(s)$' twice by '$u_1(s)u_2'(s) - u_1'(s)u_2(s)$'. (It is, of course, traditional to make this kind of mistake.)

*Page 304* 2nd line below Exercise 12.29: 'We write G(s,t)=y(s)' should be 'We write G(s,t)=y(t)'.

*Page 316* Fifth and second last lines. $\delta_1$ and $\tilde{\rho}$ should be interchanged.

*Page 319* Last sentence of proof of Theorem 13.13 should be replaced by. 'Let $V = B(w, \rho)$, $B = f^{-1}(V)$ and apply Lemma 13.12 and Lemma 13.19.

*Page 345* First word of sixth line is 'yes' rather than 'no'.

[Which, for some reason, reminds me of Vanbrugh's *The Provoked Wife*

Belinda: Ah! but, you know, we must return good for evil.

Lady Brute: That may be a mistake in the translation.]

*Page 350* Line 16. Replace '$n \to 0$' by '$n \to \infty$'.

*Page 353* [A clarification rather than a correction] End of second paragraph add 'We note that $\theta(x_j) \to [\mathbf{x}]$.'

*Page 353* Fifth line. Replace '$j^{-1}$' by '$\theta(j^{-1})$'.

*Page 353* Lines $-11$ and $-9$. Replace '$\theta(1/2)$' by '$\theta(5/6)$'.

*Page 354* To be consistent with our choice elsewhere we should replace $\mathbb{N}$ by $\mathbb{N}^+$. [So $\mathbb{N}$ is the set of positive integers and $\mathbb{N}^+$ the set of strictly positive integers.]

*Page 408* In Exercise K7, $a_{n+1} - a_n$ is increasing (not decreasing).

*Page 415* Line 12. Replace 'decreasing' by 'increasing' to get "true if we replace '$g$ continuous' by '$g$ increasing'?".

*Page 428* In lines 3 and 4 of Exercise K49 replace '(see part (d) of Exercise 4.58)' by '(see part (e) of Exercise K48)' and 'Using part (b) of Exercise 4.58' by 'Using part (c) of Exercise K48'.

*Page 454* Exercise K.102. First line of part (i). Replace '$t \in \mathbb{T}$' by '$t \in \mathbb{R}$'.

*Page 460* Exercise K.112 middle paragraph. Replace '$f - \alpha$' by '$g - \alpha$'.

*Page 461* [Since the matrix $A$ is symmetric this is a clarification rather than a correction.] In formula in part (iv), replace $a_{i1}$ by $a_{1i}$.

*Page 465* Exercise K128. Final formula in (i) is wrong. Replace

$$\sum_{[y_{k-1},y_k]\triangle[x_{i-1},x_i]} \quad \text{by} \quad \sum_{\substack{[y_{k-1},y_k]\cap[x_{i-1},x_i]\neq\emptyset \\ [y_{k-1},y_k]\not\subseteq[x_{i-1},x_i]}}$$

In line $-3$ '$j(b-a)/N$' should be replaced by '$j(b-a)/n$'.

*Page 477* Exercise K147. First sentence repeated twice.

*Page 537* Exercise K257. '$(-1)^n$' missing.

$$\cosh x \cos x = \sum_{n=0}^{\infty} \frac{(-1)^n 4^n x^{4n}}{(4n)!}$$

*Page 556* Exercise K293. In first formula in (ii), replace $f(t,u)$ by $f(t,x)$.

*Page 568* Line $-3$ 'use' should be 'used'.

*index* Should contain 'Leader, Imre' page 505. Might contain Peirce pages 108 and 453