

## 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 Løv. I should also like to thank Marit Sandstad, Norton Starr, Wan-Teh Chang, Silas Davis, Vito Videtta, Daniel James, Eliya Gwetta, Johan Grundberg, Robin Chapman and Kassra Rashidian for contributions.

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

*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 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  $h \rightarrow x$  by  $h \rightarrow 0$ .

*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

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

*Page 170* Exercise 8.21 (ii) comma missing.  $s(f^2D)$  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  $f : [a, b] \rightarrow \mathbb{R}$  is continuous with only a finite number of local maxima and minima then ...’.

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

*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  $m^{-1} \sin(\pi/(2n))$ . Show that  $YW$  has length  $2(\sin(\pi/2n))^2$  and deduce, or prove otherwise, that the triangle  $XAB$  has area given by  $\sin(\pi/n)((2m)^{-2} + 4(\sin(\pi/2n))^4)$ . 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)  $H(t) \rightarrow 0$  as  $t \rightarrow 0$  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,  $y(s+) = \lim_{t \rightarrow s, t > s} y(t)$  and  $y(s-) = \lim_{t \rightarrow s, t < s} y(t)$ .’

*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 ‘ $n \rightarrow 0$ ’ by ‘ $n \rightarrow \infty$ ’.

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

*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