CORRECTIONS TO THE PLEASURES OF COUNTING

T. W. KÖRNER

The following pages contain the list of corrections and additions for the first reprinting. I should like to thank Robin Chapman of Exeter (first mistake spotted), Professor Cassels, Dr Garling, Dr Osborne, Professor Barenblatt, and Prof J. Taylor (all of Cambridge), Harold N. Ward (University of Virginia), Adam Atkinson, Paul Shallhorn and Pat Henry for spotting various problems and *for telling me about them*. I would particularly like to thank Douglas Quadling and Dr Francis Clarke (Swansea) for long lists of useful comments.

Side note on page 54

Some bats have a mechanism for making themselves temporarily deaf when emitting sound bursts. (See [260], a book evidently written by a man who has never seen a bat he did not love.) They use high frequency sound because their prey is small.

Side note on page 190

According to Arnol'd in [264], Kolmogorov started as a student of history. His first paper, written when he was seventeen, concerned the mediaeval tax records in Novgorod. After he had presented his conclusions to a seminar he asked the historian in charge whether he agreed with them. 'Young man,' the professor said, 'in history we need at least five proofs for any conclusion.' Next day, Kolmogorov switched to mathematics.

Side note on page 221

When we talked about oxygen absorption we assumed that the area for absorption A was related to the volume V of an animal in the same way as the surface area of a sphere is related to its volume so that $A \propto V^{2/3}$. But we noted on page 218 that lungs look very 'fractal'. If the surface of the lung has 'Richardson number' different from the surface of a sphere then we would have $A \propto V^{\beta}$ with $\beta \neq 2/3$ and the slope of the mouse-elephant curve becomes easier to explain. (See pages 342-5 of [261].)

Side note on page 392

However, most of those whose opinions I respect reject Penrose's views on the nature of human thought 'not because they are crazy, but because they are not crazy enough'.

Side note on page 501

(Added in second printing.) If you wish to write complex formulae, I strongly recommend Grätzer's *Math Into LaTeX* [263].

Side note on page 505

Hacker lore says that two heads are faster than one and three heads slightly faster than two. Thereafter, adding manpower to a software project actually makes it slower. The only way to speed up a project is to use cleverer people. Hence the *three Knuth rule*. If three Knuths working together cannot do it, it cannot be done.

Page 53,line before (i) add (The restrictions on θ_1 are rather arbitrary, but some restrictions are needed.)

Page 53, near middle of written matter. Replace $\angle BCX$ by $\angle ACX$.

Page 53, 4 lines up. Replace $a = AX\cos\theta_1$ by $AX = a\sin\theta_1$.

Page 53, last displayed formula

$$a\sin\theta_1 = 2r\sin\frac{\theta_1 - \theta_2}{2}$$

Page 59 middle. Replace *for* $1 \leq i \leq n$ *and guess that that* a_{m+1} *will be close to*

$$T_n(a_{m-n+1}, a_{m-n+2}, \ldots\ , a_m) = P(n)$$

by

for $0 \leq i \leq n-1$ *and guess that that* a_{m+1} *will be close to*

$$T_{n-1}(a_{m-n}, a_{m-n+1}, \ldots\ , a_m) = P(n)$$

Page 79, line 2 replace $k = b = 1$ by $k = c = 1$

Page 79, line 2 replace $b(t) = 1 - r(t)$ by $b(t) = 1 + r(t)$

Page 79, first displayed formula, replace $r'(t) = -(1 - r(t))r(t)$ by

$$r'(t) = -(1 + r(t))r(t).$$

Page 79, second displayed formula, replace $\frac{r(t)}{1-r(t)} = \frac{r(0)}{1-r(0)}e^{-t}$ by

$$\frac{r(t)}{1 + r(t)} = \frac{r(0)}{1 + r(0)}e^{-t}.$$

Page 79, end of first para replace $r(t) \to 0$ for all $t > 0$. by $r(t) \to 0$ as $t \to \infty$.

Page 120, 2nd displayed formula. Replace $\tau = gl^{-1}t^{-2}$. by

$$\tau = gl^{-1}t^2.$$

Page 120, 4th displayed formula. Replace $gl^{-1}t^{-2} = A$ by

$$gl^{-1}t^2 = A.$$

Page 120, 5th displayed formula. Replace $t^2 = A\frac{g}{l}$ by

$$t^2 = A\frac{l}{g}.$$

Page 120, 6th displayed formula. Replace $t = C\sqrt{\frac{g}{l}}$ by

$$t = C\sqrt{\frac{l}{g}}.$$

Page 120, line -7 replace varies inversely with by is proportional to

Page 121, REPLACE side note as follows

According to materials scientists, when molten glass cools it remains a liquid but one whose coefficient of viscosity increases as the temperature decreases. Thus we can blow glass at high temperatures, mold it at lower temperatures and so on. However, the demonstration of liquid properties for glass at room temperature lies at the very edge of modern experimental technique.

Page 126, add at end of first side note The treatment of dimension I have given follows the traditional pattern in glossing over certain points. In [261] Barenblatt takes a more modern approach and shows that, if we think a little harder, we can understand a lot more.

Page 133, bottom line. Replace wave front by shock front.

Page 143, first equation after 7.1 should not read $(x, y, z, t) = (ct', 0, 0, t)$ but should read

$$(x, y, z, t) = (ct, 0, 0, t),$$

Page 166. In BOTH Figure 8.2(a) and Figure 8.2(b) replace $\sqrt{2}$ on x-axis by $1/\sqrt{2}$.

Pages 167 to 171. Wherever $))b/N$ appears replace with $))b/(2N)$

Page 168 lines 7, 8 and 9. Replace $f(rb/N)b/N$ by $f(rb/N))b/(2N)$

Page 171, second displayed formula, replace h by $\dfrac{h}{2}$

Page 171, second to displayed formula, replace η by $\eta/2$

Pages 175 and 176. Replace $\sqrt{\dfrac{g}{l}}$ in all its four appearances by $\sqrt{\dfrac{l}{g}}$.

Page 176, 5th line. Replace $b_0(g/l)^{1/2}$ by $b_0(l/g)^{1/2}$.

Page 177, 3/4 down. Replace collected paper with by collected papers) with

Page 177, replace *velocity?)*: by *velocity?*:

Page 186, top third TWICE replace $K(t)$ by Kt.

Page 187, 1/3 down. Replace not much bigger than l by not much bigger than l^2.

page 264, figure (e) replace 3 on top path by 2. Replace 1 on almost vertical path by 0.

Page 271, Figure 11.5. Label on edge XY replace $10p + 10$ by $p + 10$.

page 274, last line but one of Exercise 11.2.6. Replace $10p + 10$ by $p + 10$.

Pages 277 to 278. Can we move last line on 277 to become first line on 278.

Page 278 line 19. Extra space to turn stop?')are into stop?') are

Page 290 line -5 replace *for all integer r with $R \geq 1$* by
for all integers r with $r \geq 1$.

Page 291, last displayed formula. Replace 2π by $(2\pi)^{1/2}$ to give:-

$$n! \approx (2\pi)^{1/2} e^{-n} n^{n+1/2}.$$

Page 311, 3/4 way down. Replace Hodge's by Hodges'.

Page 331, 3/4 way down. Replace `A` is encoded by `SA`, `B` by `SB` and so on. by
`A` is encoded by `S(A)`, `B` by `S(B)` and so on.

Page 364, 1/4 way down. Replace Feynmann by Feynman.

Page 391, 7/8 way down. Replace Hodges's by Hodges'.

Page 392, 3/8 way down. Replace Hodges by Hodges'.

Page 403 Replace the first part of the proof by

Proof *(i)* Note first that, since $0 \leq u \leq 1/2$, we have

$$\frac{u}{1-u} \leq 1.$$

Thus, by the binomial theorem,

$$\begin{aligned} 1 = (u + (1-u))^N &= \sum_{r=0}^{N} \binom{N}{r} u^r (1-u)^{N-r} \\ &\geq \sum_{r=0}^{uN} \binom{N}{r} u^r (1-u)^{N-r} = (1-u)^N \sum_{r=0}^{uN} \binom{N}{r} \left(\frac{u}{1-u}\right)^r \\ &\geq (1-u)^N \sum_{r=0}^{uN} \binom{N}{r} \left(\frac{u}{1-u}\right)^{uN} = u^{uN}(1-u)^{(1-u)N} \sum_{r=0}^{uN} \binom{N}{r}. \end{aligned}$$

Multiplying both sides of the inequality by $u^{-uN}(1-u)^{-(1-u)N}$ we have the result.

Page 405, part (iii) of Exercise 16.2.7, 2nd line. Add to if you can, I take so as to get if you can, without using a computer, I take

Page 419, First line Exercise 17.4 (ii) replace $\chi(0) < 0$ by $\chi(0) > 0$

Page 419, Second line Exercise 17.4 (iii) replace $\chi(t) < 0$ by $\chi(t) > 0$

Page 420, line 19 replace nth generation} by $n+1$st generation}

Page 428, last line of (i) replace $K = L - \frac{1}{4}$ by $K = \frac{1}{4} - L$.

Page 428 first line of (ii). Replace $K = -\frac{1}{4}$ by $K = \frac{1}{4}$.

Page 428 displayed formula in (iii). Replace $C(L) = \frac{1}{2}(\frac{1}{4} - L)^{1/2}$ to obtain

$$C(L) = \left(\frac{1}{4} - L\right)^{1/2}.$$

Page 428 final displayed formula. Replace $L - \frac{1}{4}$ by $\frac{1}{4} - L$ to obtain

$$\frac{dy}{dt} \leq \frac{1}{4} - L < 0$$

Page 440 first displayed formula in (ii). Replace by

$$\frac{dI}{dS} = \frac{dI}{dt}\frac{dt}{dS} = \frac{\beta SI - \gamma I}{-\beta SI} = -1 + \frac{\gamma}{\beta S}$$

Page 442, third displayed formula up should read

$$J = 2S_0\left(\frac{S_0}{\rho} - 1\right).$$

Page 442, second displayed formula up should read

$$S_0\left(\frac{S_0}{\rho} - 1\right) = \left(1 + \frac{\nu}{\rho}\right)$$

Page 443 line 10 replace Claude by Claud

Page 490 replace $\mathrm{Adam's}$ by $\mathrm{Adams'}$

Page 517, line 5 ending with $37-8$. ADD Batchelor's paper was [262].
Page 528

Additional Bibliography

[260] J. D. Altringham. *Bats, Biology and Behaviour.* OUP, Oxford, 1996

[261] G. I. Barenblatt. *Scaling, Self-similarity and Intermediate Asymptotics.* CUP, Cambridge, 1996

[262] G. K. Batchelor. Kolmogoroff's theory of locally isotropic turbulence. *Proceedings of the Cambridge Philosophical Society*, 43:533-59, 1947.

[263] G. A. Grätzer. *Math into LaTeX.* Birkhäuser, Boston, 1996.

[264] S. H. Lui. An interview with Vladimir Arnol'd. *Notices of the AMS*, 44(3):432-8, April 1997.

Page 531, add page reference
historians, killjoy, routed, 104, 153, 190
Page 531 under Knuth K. E. add item
three Knuth rule, 505
Page 531, replace lungs, as surfaces of nearly infinite area, 218 by
lungs, as fractals, 218, 221
Page 531 under menagerie, mathematical add item
bats, 54

[Printed out July 9, 1997. These notes are written in LaTeX2e and stored in directory `~twk/FTP` on moa in (I hope) read permitted form in a file labeled `Cor.tex`. It may be accessed via my web home page

`http://www.pmms.cam.ac.uk/home/emu/twk/.my-home-page.html`.

Also available:-

'Dr Körner's Helpful Guide For Mathematicians Seeking A Cambridge Research Fellowship',

'In Praise of Lectures' (how to listen to a mathematics lecture),

'An Unofficial Guide To Part III',

'How to Write a Part III Essay',

'A Supervisor's Primer'.]