Corrections and Changes to the Second Printing

Revised July 29, 2004

The second printing has 10 9 8 7 6 5 4 3 2 on the first left-hand page.

Bullets mark the more significant changes or corrections: altered hypotheses, non-evident typos, hints or simplifications, etc.

p. 10, Def. 1.6B: *read:* Any such $C\dots$

• p. 30, Ex. 2.1/3: *replace:* change the hypothesis on $\{b_n\}$ *by:* strengthen the hypotheses (cf. p. 405, Example A.1E for the meaning of "stronger")

p. 47, Ex. 3.3/1d: *delete the semicolons*

• p. 48 *add the problem:*

3-5 Given any c in $\mathbf{R}$, prove there is a strictly increasing sequence $\{a_n\}$ and a strictly decreasing sequence $\{b_n\}$, both of which converge to c, and such that all the a_n and b_n are

(i) rational numbers; (ii) irrational numbers. (Theorem 2.5 is helpful.)

• p. 58, Ex. 4.3/2: *Omit.* (too hard)

p. 60, Ans. 4.3/2: *read:* 1024

p. 63, display (9): *delete:* > 0 p. 63, line 11 from bottom: *read:* 5.1/4

p. 68, line 10: *replace:* hypotheses *by:* symbols

• p. 74, Ex. 5.4/1 *Add two preliminary warm-up exercises:*

a) Prove the theorem if $k = 2$, and the two subsequences are the sequence of odd terms a_{2i+1}, and the sequence of even terms a_{2i}.

b) Prove it in general if $k = 2$.

c) Prove it for any $k \geq 2$.

• p. 75, Prob. 5-1(a): *replace the first line of the "proof" by:*

Let $\sqrt{a_n} \to M$. Then by the Product Theorem for limits, $a_n \to M^2$, so that

p. 82, Proof (line 2): *change:* a_n *to* x_n

p. 89, Ex. 6.1/1a: *change* c_n *to* a_n

p. 89, Ex. 6.1/1b *add:* to the limit L given in the Nested Intervals Theorem.

• p. 89, bottom, *add:* **3.** Find the cluster points of the sequence $\{\nu(n)\}$ of Problem 5-4.

• p. 90, *add Exercise 6.3/2:* **2.** Prove the Bolzano-Weierstrass Theorem without using the Cluster Point Theorem (show you can pick an x_{n_i} in $[a_i, b_i]$).

p. 90, Ex. 6.5/4: *read:* non-empty bounded subsets

p. 95, Display (6): *delete:* e

p. 106, l. 10 *read:* $-\sum(-1)^n a_n$

p. 107, l. 2,3 *insert:* this follows by Exercise 6.1/1b, or reasoning directly, the picture

p. 108, bottom half of the page *replace everywhere:* "positive" and "negative" by "non-negative" and "non-positive" respectively

• p. 148, Ex. 10.1/7a(ii) *read:* is strictly decreasing

p. 154, line 8 from bottom *insert paragraph:*

On the other hand, functions like the one in Exercise 11.5/4 which are discontinuous (i.e., not continuous) at every point of some interval are somewhat pathological and not generally useful in applications; in this book we won't refer to their x-values as points of discontinuity since "when everybody's somebody, then no one's anybody".

p. 161, line 11: *delete ;* , line 12: *read* <, line 13 *read* $\leq$

- p. 164, *read:*

Theorem 11.4D' Let $x = g(t)$, and I and J be intervals. Then

$g(t)$ continuous on I, $g(I) \subseteq J$, $f(x)$ continuous on $J \Rightarrow f(g(t))$ continuous on I.

p. 167, Ex. 11.1/4 *read:* exponential law, $e^{a+b} = e^a e^b$,

- p. 168, Ex. 11.5/2: *rewrite:* Prove $\lim_{x \to \infty} \sin x$ does not exist by using Theorem 11.5A.

p. 180, Ex. 12.1/3: *read:* a polynomial

p. 181, Ex. 12.2/3: *change:* solutions *to* zeros

- p. 188, Ques. 13.3/3: *read:* $(0, 1]$
- p. 192, Ex. 13.1/2 *renumber as 13.2/2, and change part (b) to:*

  13.2/2b Prove the function of part (a) cannot be continuous.
- p. 192, Ex. 13.3/1: *read:* $\lim f(x) = 0$ as $x \to \pm\infty$

p. 193, Ex. 13.5/2 *change the two* R *to* $\mathbf{R}$

- p. 195, Ans. 13.3/3: *change to:* $\frac{1}{x}\sin(\frac{1}{x})$; as $x \to 0^+$, it oscillates ever more widely

p. 204, line 4: *read:* an open I

- p. 208, line 13: *replace by:* then show this limit is 0 and finish the argument using (b).

p. 228, Ex. 16.1/1a,b *read:* $(0, 1]$

p. 228, Ex. 16.2/1 *read:* the converse of each statement in (8) is not true

p. 230, Ans. 16.1/2 *change 9 to 0*

p. 231, line 3- *change k to a*

p. 235, display (15): *change* $0 < |x| < |x|$ *to* $\begin{cases} 0 < c < x, \\ x < c < 0\ . \end{cases}$; *delete next two lines*

p. 243, Example 18.2, Solution, lines 4 and 7 *read:* $[0, x_1]$

- p. 248, Ex. 18.2/1 *add:* Hint: cf. Question 18.2/4; use $x_i^2 - x_{i-1}^2 = (x_i + x_{i-1})(x_i - x_{i-1})$.

p. 248, Ex. 18.3/1 *replace n by k everywhere*

p. 260, Defn. 19.6 *read:* $a = x_0 < x_1 < \ldots < x_{n-1} < x_n = b$

p. 261, Solution. (b) *read:* $[1/(n + 1)\pi, 1/n\pi]$

p. 261, Lemma 19.6 *rename: Endpoint Lemma*

p. 261, line 7- *replace:* $[c, d]$ *by* $[a, b]$

p. 265, Ex. 19.6/1b line 2 *replace:* $f(x)$ *by* $p(x)$

- p. 284, Ex. 20.3/5b: *change to:*

  (b) In the picture, label the u-interval $[a_1, x]$ and the v-interval $[a_2, y]$.

  If a continuous strictly increasing elementary function $v = f(u)$ has an antiderivative that is an elementary function, the same will be true for its inverse function $u = g(v)$ (which is also continuous and strictly increasing, by Theorem 12.4).

  Explain how the picture shows this.

p. 289, Ans. 20.5/1: *read:* 1024

p. 307, Example 22.1C *read:* Show: as $n \to \infty$, $\dfrac{n}{1 + nx} \ldots$

p. 310, Theorem 22.B *read:* $\sum_0^\infty M_k$

p. 322, Ex. 22.1/3 *read:* $u_k(x) =$

p. 332, middle *delete both* $\aleph_1$, *replace the second by* $N(\mathbf{R})$

p. 344, Prob. 23-1 hint: *change* continuities *to* discontinuities

p. 357, Theorem 24.7B, line 2 *read:* non-empty compact set S; line 6 *read:* bounded and non-empty;

p. 385, line 2- *read:* $\int_0^1$

p. 404, Example A.1C(i): *read:* $a^2 + b^2 = c^2$