Changes to text in printings 1-7 (Intro. to Analysis – Mattuck)

(Changes to Exercises, Problems, Questions and Answers are in a separate list.)

To determine Printing: Printing 3 has 10 9 8 7 6 5 4 3 on the first left-hand page, e.g.

Printing 1 involves all the items below; Printing 2 only those starting with 2 or 3;
Printings 3-7 only those starting with 3. (Printing 8 incorporates all of them.)

This list omits: minor English typos, minor mathematical typos if judged not confusing.
(Printing 8 incorporates almost all of these too.)

Bullets mark the more significant small changes or corrections: missing or altered hypotheses, non-evident typos, new hints or simplifications; “line 5-” = fifth line from the bottom;
Double Bullets are used for more substantial additions or rewritings.

3 p. 10, Def. 1.6B: read: Any such $C$
1 p. 52, Example 4.2, Solution: change: $-u$ for $u$ to: $-u$ for $a$.
3 p. 55, line 7: read: $if 0 < |e_n| < .9$
1 p. 55, line 11: read: $e_0^4$
3 p. 57, display (17): read: $if 0 < |e_n| \leq .2$
3 p. 63, display (9): delete: $> 0$
3 p. 63, line 11-: read: 5.1/4
1 p. 67, line 1: read: Example 5.2C
3 p. 69, line 9: read: strictly increasing, clearly $n_1 \geq 1, n_2 \geq 2, and so on, so eventually$
lines 11, 13: replace: $i \gg 1$ by: $i > N$
3 p. 73, line 2: read: $a_n - L$
3 p. 73, line 6-: read: and estimate it: use 2.4(4), and (16a), suitably applied to $\{b_n\}$.
3 p. 82, Proof (line 2): change: $a_n$ to $x_n$
3 p. 95, display (6): delete: $e$
1 p. 104, Display (12). change: $f(n)$ to $f(n + 1)$.
3 p. 104, line 10- read: $N + 1$
3 p. 106, line 10 read: $\sum (-1)^{n+1}/n$
3 p. 107, line 2 insert after : this follows by E-6.1/1b or E-5.41a, or reasoning directly,
3 p. 108, bottom half through top p.109 replace everywhere: “positive” and “negative”
by “non-negative” and “non-positive” respectively
3 p. 114, line 3- replace: $\leq$ by $<$
3 p. 115, line 12: read: $|a_n| < 1$
3 p. 121, line 9 read: 8.4A

3• p. 122 The proof given mislabels the two key sums in line 11, and doesn’t show the absolute convergence of $\sum c_n$. Fix it by replacing line 12 with:
$= d_n - e_n$, where $d_n$ and $e_n$ are respectively the two positive series in the line above.
Then correct the rest by replacing everywhere $c_n^+$ and $c_n^-$ by $d_n$ and $e_n$ respectively.

For the absolute convergence, insert the following before the final paragraph of the proof:
Since $\sum d_n$ and $\sum e_n$ are positive series, they are absolutely convergent, and
$\sum |c_n| = \sum |d_n - e_n| \leq \sum (|d_n| + |e_n|) = \sum d_n + \sum e_n$,
which shows by the comparison theorem that $\sum c_n$ is also absolutely convergent.

3• p. 143, Example 10.3A and Solution. in $x^4 < x^2$, $x^3 < x^2$ replace $<by \leq$
3 p. 144, line 4- read: non-zero polynomial
3 p. 154, first line below pictures: read: points of discontinuity
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 everyone is somebody, then no one’s anybody”.
3 p. 156, line 4: read:
\[
\text{In (8) below, the first limit exists if and only if the second and}
\text{third exist and are equal;}
\]
3 p. 157, line 5: read:
\[
\text{x < \( -1 \)}
\]
3 p. 161, line 11: delete ;, line 12: read <, line 13 read \( \leq \)
3 p. 164, Theorem 11.4D: read:
\[
\text{Let} \ x = g(t) \ \text{and} \ g(I) \subseteq J, \ \text{where} \ I \ \text{is a} \ t \text{-interval,} \ J \ \text{an} \ x \text{-interval. Then}
\text{\( g(t) \) continuous on} \ I \ \text{and} \ f(x) \ \text{continuous on} \ J \Rightarrow \ f(g(t)) \ \text{continuous on} \ I.
\]
3 p. 208, line 13: replace by:
\[
\text{then show this limit is 0 and finish the argument using (b).}
\]
3 p. 218, Example 18.2, Solution, lines 4 and 7: read: \([0, x_1]\)
3 p. 245 lines 1,2: read: \( f(x_i - 1))\), line 15: two underscripts: \( [\Delta x_i] \)
3 p. 260, Defn. 19.6: read:
\[
\text{a) \( \tan x \) is piecewise monotone with respect to} \ < 0, \pi/2, 3\pi/2, 2\pi >, \ \text{but not piecewise}
\text{continuous since its limits at} \ \pi/2 \ \text{and} \ 3\pi/2 \ \text{are not finite.}
\]
(b) read: \([1/(n + 1)\pi, 1/n\pi]\)
3 p. 261, Lemma 19.6 rename: Endpoint Lemma
3 p. 261, line 7-: replace: \([c, d]\) by \([a, b]\)
3 p. 273, line 2-: read: (cf. p. 271)
3 p. 282, line 2-: read: by interpreting the integral and limit geometrically
1 p. 294, line 6 from bottom: integral on the right is
\[
\int_a^b g(x) \, dx
\]
3 p. 307, Example 22.1C read: Show: as \( n \rightarrow \infty \), \( \frac{n}{1 + nx} \)
3 p. 310, Theorem 22.B read: \( \sum_{k=0}^{\infty} M_k \)
1 p. 311, line 3-: change \( 4 \) to \( 3b \)
3 p. 316, Theorem 22.5A: delete: for all \( n \geq 0 \)
1 p. 331, line 3: change 21.1c to 23.1Ac
3 p. 332, middle delete both \( \aleph_1 \), replace the third display by: \( \aleph_0 = N(\mathbb{Z}) < N(S) < N(\mathbb{R}) \)
3 p. 335, lines 6-7-: read: bounded and have only a finite number of jump discontinuities
3 p. 340, replace last 9 lines of text before Questions 23.4 with the following:

Using Lebesgue integrals, simple versions of the Fundamental Theorems of Calculus are:

**Second Fundamental Theorem.** On I, if f(x) is L-integrable and F(x) = ∫₀^x f(t) dt, then F′(x₀) = f(x₀) at any point x₀ ∈ I where f(x) is continuous.

**First Fundamental Theorem.** ∫ₐᵇ F′(x) dx = F(b) − F(a), if F(x) is differentiable on [a, b] and F′(x) is L-integrable. (For both statements, there are versions with weaker hypotheses, which use the “almost everywhere” notion somewhere in the statement.)

3 p. 350, line 10 - read: Subsequence Theorem 5.4
3 p. 351, line 5 - read: infinite quarter-planes containing the x-axis and lying between
3 p. 353, line 4 - read: 24.4A;
3 p. 354, Theorem 24.5B: read: for all xₙ
3 p. 355, line 6 - read: bounded and non-empty;
3 p. 357, Theorem 24.7B, line 2 - read: non-empty compact set S;
3 p. 358, line 10 - read: x + y = 2
3 p. 359, line 2 - read: f(xₙ)

3 p. 388, footnote: read: The first inequality in (7) is the analog, for absolutely convergent improper integrals, of the infinite triangle inequality for sums (E-7.3/1). Its proof goes:

For a fixed x, we have by the Absolute Value Theorem for integrals (19.4C)

\[ \left| \int_R^S f(x, t) dt \right| \leq \int_R^S |f(x, t)| dt, \quad \text{for all } S > R, R \text{ fixed.} \]

As S → ∞, the right side has the limit \( \int_R^\infty |f(x, t)| dt \), since the integral \( \int_R^\infty f(x, t) dt \) is assumed to be absolutely convergent.

The left side has the limit \( \int_R^\infty f(x, t) dt \), since the integral is convergent (by theorem 21.4), and \( |f| \) is a continuous function.

Finally, by the Limit Location Theorem 11.3C (21), the inequality is preserved as S → ∞.

1 p. 391, Th. 27.4A line 2: replace I by [a, b]
3 p. 399, line 18 - read: a(b + c) = ab + ac
3 p. 404, Example A.1C(i): read: \( a^2 + b^2 = c^2 \)

3 p. 429 last 5 lines: replace the sentences by:

As the picture shows, since \( |f′(x)| > 1.2 \) on [.7, 1], its reciprocal \( |g′(x)| \) satisfies \( |g′(x)| < 1/1.2 \approx .8 \) on the interval \( [0, f(.7)] = [.83] \).

This shows Pic-2 is satisfied for \( g(x) \) on the interval \([.83, .83]\); the picture shows the root of \( x = g(x) \) will lie in this interval. Thus the Picard method can be used to solve \( x = g(x) \).

Starting with say .7, it leads to a root \( \approx .76 \).

3 p. 436, Remarks, first paragraph: replace \( x^3 \) by \( x^4 \)
3 p. 439, top half: change p and q to P and Q (to avoid confusion with the use of the real number p in Example D.4)
3 p. 442, line 2: read: ≥ line 6: read: ≤
3 p. 459, ruler function: read: 169