Advanced Calculus: An Introduction to Linear Analysis
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First Printing Errata & Addenda **May 15, 2014**

1. p. 19, Exercise 1.45. The Hint should refer to Exercise 1.32—not to Problem 5.

2. p. 44, Exercise 2.12. This problem should say that the the function f has a jump discontinuity at a if $\lim_{x \to a-} f(x) \neq \lim_{x \to a+} f(x)$ although both one-sided limits exist.

3. p. 57, Example 2.6, line 3b from the bottom of the example should have the letter p instead of f in the inequality. The function under consideration is the polynomial p (not f).

4. p. 63, Theorem 2.5.3, The first sentence of the proof should be "First, suppose that $v_n \to v$, which we understand to mean that $\|v_n - v\| \to 0$." There is no interval $[a, b]$ in this theorem.

5. p. 64, Example 2.11, should say $f_n \in \mathcal{C}[0, 1]$ for all $n \geq 2$. Here the interval $[a, b]$ is in fact $[0, 1]$.

6. p. 65, in the proof of Dini's theorem, the choice of r_x needs to satisfy the requirement that $|x' - x| < r_x$ AND $x' \in [a, b]$ implies the stated inequality for h_{N_x}.

7. p. 70: In the statement of Definition 3.1.2 there is no need to assume f is bounded. The definition is shown in Theorem 3.1.1 to imply boundedness of every Riemann integrable function.

8. p. 74, Exercise 3.2 Part (b) should refer to Part (ii) of the cited theorem.

9. p. 80, Theorem 3.2.3. The first summation in the proof should show the summation index i running from 1 to n—not k as it appears.

10. p. 80, Theorem 3.2.4, the partition P cited in the statement of the theorem is called by the name P' in the proof. Thus it would have been clearer to call it P' in the statement of the theorem, since P is used again but differently in the course of the proof.

11. p. 84, line 6, the function f should be f_n on the left side of the equation, as it is on the right.

12. p. 91, we understand m_f, m_g, m_{fg} to be infima of the named functions, by analogy with the definitions given for M_f, M_g, M_{fg} given earlier.

13. p. 103, Exercise 4.2 should say $x_n \in D_f \setminus a$ rather than $X_n \in D_f \setminus a$.

14. p. 113, Exercise 4.33: $g(x)$ should have a *plus* sign instead of a *minus* sign. I.e., this *should read*:

$$g(x) = 2x \cos(\pi/x) + \pi \sin(\pi/x),$$

    not $g(x) = 2x \cos(\pi/x) - \pi \sin(\pi/x)$.

15. p. 133, Exercise 5.5. The word *Given* should be *Give*: Give an example of $x_k \to 0$ for which $\sum_{k=1}^{\infty} (-1)^{k+1} x_k$ *diverges*.

16. p. 137, proof of Ratio Test. $0 < x_k < x_{k+1}k$ *should read*: $0 < x_k < x_{k+1}$.

17. p. 155, the limit of the sum should be $n - m > 1$ if $n > m + 1$.

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18. p. 157, lines 6-7. x_0 should be the specific but arbitrary point fixed in $(-1, 1)$, and x is the generic point in $[-r, r]$. This should express $f'(x_0)$ in terms of x_0, not x. It is valid for all $x_0 \in (-1, 1)$.

19. p. 158, Exercise 5.45, the interval should be $[0,1]$ throughout—not $[0,2\pi]$. Also, the conclusion should have been
$$a_k = 2\int_0^1 f(x)\cos 2\pi kx\,dx,$$
for $k > 0$, and $a_0 = \int_0^1 f(x)\,dx$.

20. p. 166, Proof of Theorem 5.7.3. The conditions on $|x|$ should be on $|x-a|$. For example, $|x-a| < R$ rather than $|x| < R$. Also, on Line 11, the summation index should be n, not k.

21. p. 187, Definition 6.2.5. There is an extra right parenthesis, unlikely to cause any confusion however.

22. p. 190: Exercise 6.14 deserves a Hint: Use Theorem 3.24, write $\int_a^b f(x)\,dx = re^{i\theta}$, and see Definition 6.2.5.

23. p. 197, Exercise 6.29. The constants should be indexed as $c_{-n},\ldots,c_n$, and they are any $2n+1$ complex constants.

24. p. 198, line 3b: the right-hand big parenthesis should be before dt rather than after. This should not cause confusion.

25. p. 204, Exercise 6.38. The condition $k \to \infty$ should read $|k| \to \infty$, since the sum is over all the integers, not just the positive integers.

26. p. 207, Remark 6.5.2. The reference should be to Exercise 6.42, not Exercise 6.5.2.

27. p. 211, last line, sub–exercise (b) did not indent so as to be vertically aligned with (a). There should be no confusion from this.

28. p. 296, Exercise 10.31, $\mathbb{E}^3$ should be $\mathbb{E}^2$.

29. p. 297, Exercise 10.42. The mapping $\mathcal{D} : \mathbb{E}^n \to \mathbb{E}^m$. Its domain is not as stated in the text.

30. p. 301, In the proof of Theorem 10.3.3, the equation should read $f'(x) = 0 \in \mathcal{L}(\mathbb{E}^n, \mathbb{E}^n)$. The (x) had been omitted, but it is the *values* of f' that are linear transformations.

31. p. 303, Exercise 10.44. The brackets were missing in $[\mathbf{g}'(\mathbf{0})]$ and $[\mathbf{f}'(\mathbf{x}_0)]$ to indicate that these are *matrices* of the linear transformations.

32. p. 309, line 5. D should be $\mathbf{f}(D)$.

33. p. 309, Exercise 10.60(b). $\cos 2$ should be $\cos x_2$.

34. p. 313, last line of proof of Theorem 10.5.1. r should be $r\sqrt{2}$.

35. p. 356, Exercise 11.56. Corrections: $T \in \mathcal{C}^1(\mathbb{E}^n)$. ($T$ is an *affine* map, not a linear map.) Also, $f \circ T \in \mathcal{R}(T^{-1}B)$.

36. p. 357, Exercise 11.57 part (c) should say that if $f \in \mathcal{R}(B)$, then $f \circ A \in \mathcal{R}(A^{-1}B)$. A is understood to represent a linear transformation.

37. p. 365, Exercise 1.63. The answer has two errors. Replace it with $y_j = \frac{1}{j}\left(1 + \frac{(-1)^j}{2}\right)$.

38. p. 370, answer section, 4.25. $F'(x) = 2xe^{-x^4}$.

39. p. 370, answer section, 4.45. The limit is $9P''(x)$.
40. p. 373, answer section, 6.52.b. The answer should be $\frac{1}{18}$.