Corrections - Volume 1

- **Page 8.** The last but one sentence should read "Since $0 \neq 1$ it follows that there is *no* real number x..."
- **Page 13.** In the paragraph below Figure 1.1. the set should read "$\mathbb{R}_+ := \{x \in \mathbb{R} \,|\, x \geq 0\}$".
- **Page 30.** Equation (2.34) should read "$(x \in X \cup Y) \implies (x \in Y \cup X)$".
- **Page 30.** Equation (2.40) should read: $X \cup (Y \cap Z) = (X \cup Y) \cap (X \cup Z)$.
- **Page 44.** The fourth line from the top should read "$\frac{x^{n+1}+x^{n+2}-x^{n+1}-1}{x-1} = \ldots$"
- **Page 63.** The sentence 13 lines from the top should read "In Problem *10* we will show..."
- **Page 66.** The tenth line from the top should read "... $R = \{(k, -k) \,|\, k \in \mathbb{Z}\} \subset \mathbb{Z} \times \mathbb{Z}$..."
- **Page 66.** Definition 4.5 should read: A **mapping** $f : X \to Y$...
- **Page 71.** In the first four lines only, the symbol $\mapsto$ should be replaced by $\to$.
- **Page 91.** In Figure 6.1 the interval D should be $[A, B]$.
- **Page 96.** Equation (6.21) should read: $\lim_{y \to x} h_c(y) = c$.
- **Page 97.** In Part C. the equation should read: $p(x) = \sum_{j=0}^{M} a_j x^j = \cdots$
- **Page 118.** In Example 8.7.B. the expression should read: $\cdots g^{(3)}(x) = \cdots$
- **Page 121.** The last inequality should read: $ax > ay$.
- **Page 124.** In Problem 9 b) there should be a space before the word "Prove".

- **Page 126.** Thirteen lines from the bottom should read: $x_1 \neq 0, \cdots$
- **Page 147.** The second line from the bottom should read:

$$\ldots \arcsin \, : \, [-1,1] \to [-\frac{\pi}{2}, \frac{\pi}{2}] \ldots$$

- **Page 193.** Two lines above equation (13.18) should read: $p_j, q_l \in \mathbb{N}_0$.
- **Page 207.** The sixth line from the top should read:

$$= \left(\sum_{j=1}^{n} a_j^2 \right) \left(\sum_{j=1}^{n} b_j^2 \right)$$

- **Page 207.** The final line in the proof should read:

$$\sum_{j=1}^{n} |a_j b_j| \leq \left(\sum_{j=1}^{n} a_j^2 \right)^{\frac{1}{2}} \left(\sum_{j=1}^{n} b_j^2 \right)^{\frac{1}{2}}.$$

- **Page 231.** Problem 4. b) should read: $\sum_{n=0}^{\infty} e^{-nx}, x > 0$;
- **Page 234.** The fifth line from the top should read: there exists $N \in \mathbb{N}$, $N \geq k$, such that...
- **Page 236.** In Definition 17.8.A. the expression $a_{n_l} \neq a$ should be removed.
- **Page 237.** The third sentence of the proof of Lemma 17.10. should read: Since (a_k) is a ...
- **Page 243.** The second sentence of Theorem 18.1 should read: The series $\sum_{n=k}^{\infty} a_n$ converges ...
- **Page 243.** Equation (18.1) should read: $|\sum_{l=m}^{n} a_l| < \varepsilon$.
- **Page 245.** The last line should read: $s_1 \leq s_3 \leq s_5 \leq \cdots \leq s_{2k+3} \leq \cdots$.
- **Page 247.** In Remark 18.12. the phrase "conditionally convergent" should appear in bold font.

- **Page 251.** In Example 18.22.A. the series $\sum_{n=1}^{\infty} \frac{1}{n(\ln(n))^2}$ in the third line should be: $\sum_{n=2}^{\infty} \frac{1}{n(\ln(n))^2}$

- **Page 254.** The sixth line from the top should read: Let $r \in \mathbb{R}, r > 0$, be of the form...

- **Page 261.** The fourth line from the top should read:

$$\sum_{k=1}^{\infty} \frac{1}{2^k} \frac{|a_k + b_k|}{1 + |a_k + b_k|} \leq \cdots$$

- **Page 267.** Equation (19.12) should read:

$$y = \operatorname{sgn}(x) \sum_{l=-k}^{N} a_l 2^{-l}, \quad a_l \in \{0, 1\},$$

- **Page 269.** The ninth line from the top should read: ... assume that $x_0, \ldots, x_n \in D$ and...

- **Page 271.** Equation (19.19) should read:

$$\liminf_{n\to\infty} a_n = \liminf_{n\to\infty} a_n = a.$$

- **Page 273.** Theorem 19.27 should read: Every *non-empty* open set $A \subset \mathbb{R}$ ...

- **Page 277.** The twelfth line from the bottom should read: ... such that $0 < |y - x| < \delta$ implies $|f(y) - a| < \varepsilon$.

- **Page 279.** Definition 20.5.A. should state: **limit from the right at** x and Definition 20.5.B should state **limit from the left at** x.

- **Page 279.** The line below equation (20.2) should read: In the case where $x \in D$ and $a = f(x)$...

- **Page 280.** The first line in Example 20.8.B should read: Let $P(x) = x^k + a_1 x^{k-1} + \ldots + a_{k-1} x + a_k$ ...

- **Page 286.** The third line from the top should read: ... there is exactly one point x_0 ...

- **Page 288.** The fifth line from the top should read: these intervals, say $J(x_1), \ldots, J(x_N)$. On...

- **Page 299.** The first line of Example 21.10 should read: For $\alpha \in \mathbb{R}$ consider $f : (0, \infty) \to \mathbb{R}, x \mapsto x^\alpha$.

- **Page 305.** Equation (22.2) should read:

$$f'_+(x) = \lim_{\substack{y \to x \\ y > x}} \frac{f(y) - f(x)}{y - x} \leq 0$$

  and equation (22.3)

$$f'_-(x) = \lim_{\substack{y \to x \\ y < x}} \frac{f(y) - f(x)}{y - x} \geq 0.$$

- **Page 308.** The third line from the bottom should read: ... Now $\frac{f(x)}{g(x)} = x \sin(\frac{1}{x}) \to 0$ as ...

- **Page 327.** The last line of Exercise 23.22 should read: ... converges in $\mathbb{R}$ to $x^{(\nu)}$.

- **Page 328.** The first line of Problem 6 should read: ... assume in addition that h is ...

- **Page 333.** In the second and third lines from the bottom $\|f\|_{K,\infty}$ should be replaced by $\|f\|_{\infty,K}$.

- **Page 334.** Every norm $\|\cdot\|_{K,\infty}$ in lines 2 - 6 from the top should read as: $\|\cdot\|_{\infty,K}$.

- **Page 335.** The second line from the top should read:

$$|f_N(x) - f_N(x')| < \frac{\varepsilon}{3} \text{ for all } x' \in I, |x - x'| < \delta.$$

- **Page 336.** The second line from the top should read: such that $\|f - f_n\|_\infty \leq 1$ for ...

- **Page 335.** The third line in Definition 25.2 should read: $\varphi|_{(x_{k-1}, x_k)}$, is constant, $k = 1, \ldots, n$, i.e. $\varphi(x) = c_k$ for ...

- **Page 345.** The fifth line from the bottom should read: $\varphi|_{(x_{k-1},x_k)}$, is constant, $k = 1, \ldots, n$, i.e. $\varphi(x) = c_k$ for all ...

- **Page 346.** The fourth line in the proof of Lemma 25.4 should read: ... For $1 \leq l \leq k$

- **Page 347.** Equation (25.5) should read: $\varphi(x) \leq f(x) \leq \psi(x)$ for all $x \in [a, b]$.

- **Page 347.** Equation (25.6) should read: $\psi(x) - \varphi(x) \leq |\psi(x) - \varphi(x)| \leq \epsilon$ for all $x \in [a, b]$.

- **Page 354.** The second line from the top should read: ... there exist step functions ...

- **Page 354.** The second line in the proof of Theorem 25.17 should read: ... By $x_k := a + k\frac{(b-a)}{n}$,...

- **Page 363.** The tenth line from the bottom should read: trivial fact that if $\varphi \in T[a, b]$ and ...

- **Page 363.** The third line from the bottom should read: ... the functions $f|_{[a,c]}$ and $f|_{[c,d]}$ are integrable and ...

- **Page 376.** Equation (26.18) should read:

$$\left| \frac{e^{-at} - 1 + at}{t} \right| \leq \frac{1}{2} a^2 t.$$

- **Page 376.** The fourth line from the bottom should read:

$$0 \leq \int_0^{at} (1 - e^{-x}) \, \mathrm{d}x = at + e^{-at} - 1,$$

- **Page 376.** The second line from the bottom should read:

$$|e^{-at} - 1 + at| = \int_0^{at} (1 - e^{-x}) \, \mathrm{d}x \leq \int_0^{at} x \, \mathrm{d}x = \frac{(at)^2}{2}$$

- **Page 378.** The eighth line from the bottom should read: ... we know that $\int_a^x f_n'(t) \, \mathrm{d}t \to \int_a^x f^*(t) \, \mathrm{d}t$, ...

- **Page 395.** Definition 28.1 should read: ... interval with endpoints ...
- **Page 396.** Example 28.3 should read: ... continuous function $f_\alpha : (0, R] \to \mathbb{R}, x \mapsto \frac{1}{x^\alpha}$ ...
- **Page 399.** Equation (28.12) should read:

$$\int_a^\alpha f(x)\,\mathrm{d}x := \lim_{c\to a}\int_c^\alpha f(x)\,\mathrm{d}x$$

- **Page 405.** The fourth line from the bottom should read:

$$= \lim_{\epsilon\to 0}\lim_{R\to\infty}(-t^x e^{-t}|_\epsilon^R) + x\lim_{\epsilon\to 0}\lim_{R\to\infty}\int_\epsilon^R t^{x-1}e^{-t}\,\mathrm{d}t$$

- **Page 412.** In Definition 29.3, both $(c_n)_{n\in\mathbb{N}}$ terms should read as $(c_n)_{n\in\mathbb{N}_0}$
- **Page 417.** Equation (29.12) should read:

$$f(x) = f(c)+\frac{f'(c)}{1!}(x-c)+\frac{f''(c)}{2!}(x-c)^2+\cdots+\frac{f^{(n)}(c)}{n!}(x-c)^n+R_{f,c}^{(n+1)}(x)$$

- **Page 418.** Definition 29.12 should read: ... of f around $c \in (a, b)$ ...
- **Page 418.** Equation (29.14) should read:

$$T_{f,c}^{(k)}(x) := \sum_{j=0}^{k}\frac{f^{(j)}(c)}{j!}(x-c)^j, k = 1, \ldots, n.$$

- **Page 419.** Equation 29.22) should read:

$$f(x) = \sum_{k=0}^{n}\frac{f^{(k)}(x_0)}{k!}(x-x_0)^k + \frac{f^{(n+1)}(\xi)}{(n+1)!}(x-x_0)^{n+1}.$$

- **Page 419.** The final equation in the proof of Theorem 29.14 should read:

$$= f^{(n+1)}(\xi)\int_{x_0}^{x}\frac{(x-t)^n}{n!}dt = f^{(n+1)}(\xi)\frac{(x-x_0)^{n+1}}{(n+1)!},$$

- **Page 420.** The terms $T_f(x)$ in Example 29.18 should be replaced by $T_{f,0}(x)$.
- **Page 425.** Problem 7 should read: For $l \in \mathbb{N}_0$...
- **Page 430.** The eleventh line from the bottom should read:

$$\left| \prod_{k=N}^{n} c_k - \prod_{k=N}^{m} c_k \right| < \left| \prod_{k=N}^{m} c_k \right| \cdot \frac{2}{3}\epsilon < \epsilon,$$

- **Page 453.** Three lines above equation (31.37) should read: Thus we can extend Γ to $\mathbb{R} \setminus (-\mathbb{N}_0)$, ...
- **Page 463.** Theorem 32.4 should read: The Cantor set is a compact, *non-denumerable* null set.
- **Page 481.** The first part of equation (A.II.10) should read: $X \cup (Y \cap Z) = (X \cup Y) \cap (X \cup Z)$.
- **Page 484.** In equation (A.II.44) the A_j term should be A_i.
- **Page 545.** The third line from the bottom should read: $kp \geq 2k \geq k+1$.
- **Page 594.** The third line from the top should read:

$$= \frac{1}{a} \lim_{y \to \infty} \frac{y}{\exp(y)} = 0.$$

- **Page 594.** The tenth line from the top should read:

$$\ldots \lim_{x \to \infty} \left(\frac{x}{\exp\left(\frac{ax}{n}\right)} \right) = 0.$$

- **Page 637.** The third line from the top should read: ... and for $x > 0$ we know ...
- **Page 666.** The second line from the top should read: ... On $(x_j - \delta_{x_j}, x_j + \delta_{x_j})$ ...