Corrections to Answers to Exercises

Section 1.2
7. (b) \(|z_4| = \sqrt{\frac{5}{2}}\).

Section 2.5
31. (a) \(u(r) = \frac{100 \ln r}{\ln 2}\), (b) \(r = 2^{7/100}\).

Section 3.1
5. and 6. Change \(\arg z\) to \(\text{Arg } z\) in the statements of the exercises.

Section 3.2
9. Answer to second part: \(-\frac{3}{2} - \frac{5}{3}i\)
29. \(-4 - \frac{8}{3}i\).
38. The absolute value of the integral is less than \(2\pi/3\).

Section 3.4
3. Not mutually continuously deformable.
24. \(\frac{2}{3}(-1 + i)\).

Section 3.9
1. \(f(x) = x^2 \sin 1/x\) if \(x \neq 0\) and \(f(0) = 0\).

Section 4.1
33. \(|z| < 2; \frac{2}{2-z}\).
38. \(|z - 2 - i| > 2; \frac{2(2+i-z)}{1-z}\).

Section 4.2
22. \(1.001 \leq |z| \leq 4.9\).

Section 4.3
22. (b) \(\ldots\) of \(\sum z^n\) and \(1 + z\).

Section 4.4
5. \(R = 2\).
15. \(\sum_{n=1}^{\infty} n(n+1)(iz)^n, \ |z| < 1\).
25. \(-\frac{i}{4} \sum_{n=0}^{\infty} \frac{(n+1)(n+2)}{4} z^n, \ |z| < 2\).

Section 4.5
3. \(-1 - 2 \sum_{n=1}^{\infty} \frac{1}{z^n}\).
21. \(f(z) = \sum_{n=1}^{\infty} \frac{a}{z^n - \frac{1}{z}} = -\frac{a}{1-i} \sum_{n=0}^{\infty} (-1)^n \frac{z^n}{1+z}\).
We have three Laurent series.
In the disk \(|z + 1| < \sqrt{2}\), \(f(z) = -\frac{a}{1-i} \sum_{n=0}^{\infty} (-1)^n \frac{z^n}{1+z}\).
In the annulus, \(\sqrt{2} < |z + 1| < 2\),
\(f(z) = -\frac{a}{1+i} \sum_{n=0}^{\infty} \frac{(z+1)^n}{2^n} + \frac{a}{1+i} \sum_{n=1}^{\infty} (-1)^n \frac{(z+1)^n}{2^n}\).
In the annulus \(2 < |z + 1|\), (correction needed here)
\(f(z) = \frac{a}{2} \sum_{n=1}^{\infty} \left( \frac{2}{z+1} \right)^n + \frac{a}{1+i} \sum_{n=1}^{\infty} (-1)^n \left( \frac{z+1}{z+1} \right)^n\).
Section 4.6
17. \( z = 0 \) (not an isolated singularity), \( z = \frac{1}{2 + \pi} \) (k integer) (order 1 pole).
37. (a) ... a zero at \( z_0 \) of order \(-mn\).

Section 4.7
1. (c) \( a_n = \ldots \) (= sign is missing).

Section 5.1
14. Change path of integration to \( C_{1/10}(1) \).
37. (b) Show that \ldots \( \zeta - 1/\zeta \) is either 0 or purely imaginary \ldots .

Section 5.4
8. \( = -2e^{-\sqrt{\pi}x} \).

Section 5.5
9. \( = \pi(1 - \frac{1}{\sqrt{2}}) \). (Same answer as 10.)
13. Relabel the parts correctly (a), (b), ...
16. is numbered 6.

Section 5.7
3. 1. 5. 1.

Section 6.3
8. Use \( w = \phi(z) = \sin z \). Then \( u(z) = U(\phi(z)) \) where \( U(w) = 50 + \frac{10}{w} \text{Arg} (w - 1) - \frac{100}{w} \text{Arg} (w + 1) \).
9. Use \( w = \phi(z) = \frac{1}{2}(\frac{z}{2} + \frac{\pi}{2}) \). Then \( u(z) = U(\phi(z)) \) where \( U(w) = 100 - \frac{100}{w} (\text{Arg} (w - 1) - \text{Arg} (w + 1)) \).

Section 6.4
1. \( \theta_1 = \frac{\pi}{2} \), \( \theta_2 = \pi \), \( \theta_3 = -\frac{\pi}{2} \); \( A = -i \), \( B = 0 \); \( f(z) = (1 - z^2)^{\frac{1}{2}} \).

Section 6.5
1. To map \( \Omega \) onto the unit disk, use \( \phi(z) = \frac{1 - z}{1 + z} \). Then, for \( z = x + iy \) and \( \zeta = s + it \), \( G(z, \zeta) = \frac{1}{2} \ln \frac{(s - x)^2 + (t - y)^2}{(s + x)^2 + (t + y)^2} \).

Section 6.6
1. To map \( \Omega \) onto the upper half-plane, use \( \phi(z) = i(z - 1) \). Then, \( N(z, \zeta) = \ln |\phi(z) - \phi(\zeta)| + \ln |\phi(z) - \phi(\zeta)| = \ln |z - \zeta| + \ln |\zeta + \zeta - 2| \).
2. To map \( \Omega \) onto the upper half-plane, use \( \phi(z) = -z^2 \). Then, \( N(z, \zeta) = \ln |\zeta^2 - z^2| + \ln | - z^2 + \zeta^2| \).
3. To map \( \Omega \) onto the lower half-plane, use \( \phi(z) = -iz^2 \). Then, \( N(z, \zeta) = \ln |\zeta^2 - z^2| + \ln | - z^2 + \zeta^2| \).
4. To map \( \Omega \) onto the upper half-plane, use \( \phi(z) = z^4 \). Then, \( N(z, \zeta) = \ln |z^4 - \zeta^4| + \ln |z^4 - \zeta^4| \).
5. To map \( \Omega \) onto the upper half-plane, use \( \phi(z) = \sin z \). Then, \( N(z, \zeta) = \ln |\sin z - \sin \zeta| + \ln |\sin \zeta - \sin \zeta| \).
6. To map \( \Omega \) onto the upper half-plane, use \( \phi(z) = e^z \). Then, \( N(z, \zeta) = \ln |e^z - e^{\zeta}| + \ln |e^z - e^{\zeta}| \).

Section 7.2
3. (b) At the points \( x = (2k + 1)\frac{\pi}{4} \), the Fourier series takes on the value \( \frac{1}{4} \). At all other points, the Fourier series agrees with the function.

Section 8.9
3. \( A_m = \frac{2}{\pi (1 + 2m \tan m)} \).

Section 9.1
1. \( u(r, \theta) = 100 + 100r \cos \theta = 100 + 100x \).
Section 11.1

1. \(-i\sqrt{\frac{2}{\pi}}\ldots\)

3. \(\frac{1}{\sqrt{2\pi}} e^{-\frac{1}{w^2}} - \frac{1}{w^2}\).
Corrections to Text

p. 19. Lines 4 and 5 in Solution of Example 8:
\[ |z - 3| = |z - i + i - 3| = |(z - i) + (-3 + i)| \leq |z - i| + |-3 + i| \leq \ldots \]

p. 60. Last line on page: Change $0 < y_0 < \infty$ to $0 \leq y_0 < \infty$.

p. 82. Last part of Theorem 1 should read: If $\lim_{z \to z_0} g(z) = w_0$ and $\lim_{w \to w_0} f(w) = f(w_0)$, then

(1) \[ \lim_{z \to z_0} f(g(z)) = f \left( \lim_{z \to z_0} g(z) \right) = f(w_0). \]

p. 88. Line 2 from top: Change does to does.

p. 94. Theorem 3: Change displayed (10) to: $p'(z) = na_n z^{n-1} + (n-1)a_{n-1} z^{n-2} + \cdots + a_1$.

p. 96. Caption of Figure 2: Change $g \circ f$ to $f \circ g$.

p. 152. Line 11: Change Exercise 10 to Exercise 11.

p. 209. Exercise 32, Line 2: Change $S_R(z_0)$ to $B_R(z_0)$.

p. 219. Line 8: Change $f(z) = 0$ to $f(0) = 0$.

p. 248. Line 13: $|z|/n = 0$ should be $|z|/n+1 = 0$.

p. 254. Line 9: Theorem 5 should be Theorem 4.

p. 269. Line 5: Move $2^2$ from numerator to denominator. Line -9 (from bottom): Change "in the exercises" to "in Section 9.6."

p. 270. Lines 9, 11, 14, 17: Change $(z - z_0)$ to $(z - z_0)^n$ (4 times).

p. 271. Line 6: "and $n = 1$ if is odd" should be and "and $n = 1$ if is odd"

p. 272. Line -6 (from bottom): "and $1 + z$" should be "and $1 - z$"

p. 305. Line 14: "(iii) ⇒ (iv)" should be "(i) ⇒ (iii)"

p. 331. Line 9: $= \lim_{z \to 0} I_{0} \left( \frac{3z^3}{(x^2 + y^2)^2} \right)$ should be $= \lim_{z \to 0} \frac{4z^3}{(x^2 + y^2)^2}$.

p. 336. Line -8 (from bottom): $z_4 = \frac{1}{\sqrt{2}}$.

p. 340. Line 2: $0 \leq y \leq \frac{\pi}{\alpha}$ should be $0 \leq y \leq \frac{2\pi}{\alpha}$.

p. 359. Line 6: Change $R \to 0$ to $R \to \infty$. Same page, Figure 6, the number 2 above $\Gamma_2$ should be $\gamma_2$.

p. 360. Lines 4 and 7: arg should be $\arg_0$ (two times).

p. 370. Line 12: $f(z) = (z - z_j)^m \ldots$ should be $f(z) = (z - z_0)^m \ldots$

p. 375. Line 11: Need $\frac{1}{2\pi i}$ in front of second integral.

p. 417. Line -1 (bottom line): $+ f - 2(x)$ should be $+ f_2(x)$

p. 422. Line 5: "show $|e^{ix} \ldots$" should be "show $|e^{i\phi} \ldots$

p. 442. Line -8 (from bottom): Change $n(t)$ to $n_1(t)$. Line -10 (from bottom): Change $x'(t) + iy(t)$ to $x'(t) + iy'(t)$.

p. 446. Theorem 3: The orientation of the boundary is as follows. The outer path $C$ is positively oriented and all the inner paths $C_j$ are negatively oriented.

p. 451. Line 10: Change $N_1$ to $u_1$

p. 707. The answer is $-\frac{1}{2}w e^{-|w|}$. 

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