

# Special Functions. An Introduction to the Classical Functions of Mathematical Physics

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November 2, 2011

## Errata and Comments

1. Page ix, section number 11.4.2 should read: “Asymptotic Expansion;  $\mu$  Fixed,  $\xi$  Large, 302”
2. Page ix, section number 11.4.3 should read: “Asymptotic Expansion;  $\xi$  Large,  $\mu$  Arbitrary, 303”
3. Page 4, Equation (1.11): include  $n > 0$ .
4. Page 5, Line 4 and 5: For a proof that the tangent numbers are integers, observe that  $y(z) = \tan z$  satisfies the differential equation  $y' = 1 + y^2$ ; hence all derivatives of  $y$  at  $z = 0$  are integers.
5. Page 16, Line -3: replace  $=$  by  $= -$ .
6. Page 17, Theorem 1.4: include  $(-1)^{k-1}$  in the expression for  $R_k$ .
7. Page 18, Line 4: include  $(x)$  in the  $k$ th derivative of  $f$ .
8. Page 26, Exercise 1.11, first line: delete  $=$ .
9. Page 38, Line 9: “Chapter 10” should read “Chapter 9”.
10. Page 43, Section 3.2, Line 6-9: ... is analytic in the half-plane  $\Re z > -1$  with 0 excluded. The question about the nature of the singularity at 0 is answered as follows: from  $\Gamma(z) = \Gamma(z+1)/z$  and  $\Gamma(1) = 1$  we see that the origin is a pole of first order.
11. Page 45, Section 3.2.3, Line 7: read  $\frac{1}{2}\Gamma(p)$ .
12. Page 49, Line 2 from the bottom:  $/q$  should read  $/\pi$ .
13. Page 49, Bottom line: in the first fraction, the numerator should read  $\pi$  and not  $q$ .
14. Page 50, Line 2: replace “term” by “factor”

15. Page 52, Lines 8 and 9: The product sign must be moved to the numerator of the subsequent fraction (both in Line 8 and Line 9)
16. Page 52, Line -1: in the numerator of the middle part replace  $(mn/e)^m n$  by  $(mn/e)^{mn}$ .
17. Page 71, Line -8: the summation should start with  $n = 1$ .
18. Page 74, 3.9: replace  $e^{-\pi|y|}$  by  $e^{-\pi|y|/2}$ .
19. Page 74, Bottom line: in the first fraction, the denominator should read  $\pi$  and not  $q$ .
20. Page 76, Line -3: replace “for a start” by “for convergence”.
21. Page 77, Line 5: replace  $\Re z > 1$  by  $0 < \Re z < 1$ .
22. Page 80, Line 12:  $u(u, y, z, t)$  should read  $u(x, y, z, t)$ .
23. Page 98, Bottom line: insert “=” after the sum.
24. Page 103, Equation(4.41) and in the second line below this equation: replace  $\tau$  by  $t$ .
25. Page 131, Exercise 5.11: read  $n = 0, 1, 2, \dots$
26. Page 142, Line 4: read  $A$  and  $B$  do not...”.
27. Page 151, include the factor  $2\pi i$  in the denominator in front of the integral.
28. Page 152, Equation (6.39), denominator of the third line: Replace  $2^k$  by  $2^n$ .
29. Page 159, Line 2: replace “It is easily verified that” by “Introducing in (6.55) the new variable of integration  $u = 1 - e^{-t}$ , we easily verify that”
30. Page 170, Exercise 6.18, the subscript in the Laguerre polynomial in the sum should read  $k$  and not  $n$  .
31. Page 171, Bottom, replace the  $\sim$  by “=” (two times) and include  $+o(1)$  after the sine and cosine terms.
32. Page 173, Line before (7.7):  $Rec$  should read  $\Re c$ .
33. Page 180, Line 2 after (7.23): include  $\frac{2}{\sqrt{\pi}}$  in front of the  $M$ -function and  $\frac{1}{\sqrt{\pi}}$  in front of the  $U$ -function.
34. Page 181, Line 2, 3 and 4 (formula for  $Ei(z)$ ) should be skipped.
35. Page 181, Second line below this: (7.24) should read (7.25).
36. Page 182, Middle of the page: the number 1.089490... should read 1.1789... (twice).
37. Page 186, In subsection 7.3.8, Line 4: replace  $\exp(iz)$  by  $\exp(-iz)$ .
38. Page 186, Middle, point 7.1: “Buchholtz” should read “Buchholz”; the same correction is needed in the Index on page 366.
39. Page 190, Line 4:  $z^s$  should be  $z^{-s}$ .
40. Page 201, Equation (8.33): lower limit of integration should read  $-1$ .
41. Page 222, Equation (9.6), second formula: replace the fraction  $\frac{1}{2\pi i}$  by  $\frac{-1}{2\pi}$ .
42. Page 232, Line 8 from bottom: “Batemann” should read “Bateman”.
43. Page 236, Equation (9.44):  $(2/z)^\nu$  should read  $(2z)^\nu$ . The result holds for  $\Re z > 0$  and  $\Re \nu > -1/2$ .
44. Page 236, Line after (9.44): “(6.12)” should read “(7.12)”.
45. Page 247, Line 2 from bottom: “(3.13) and (3.14)” should read “(4.13) and (4.14)”.

46. Page 253, Line 6 from bottom: “Remark 9.2” should read “Remark 9.4”.
47. Page 255, Lines 7 and 8: replace the  $\sim$  by “=” (two times) and write  $[\cos(\zeta - \pi/4) + o(1)]$  and  $[\sin(\zeta - \pi/4) + o(1)]$  for the cosine and sine terms.
48. Page 260, Line 6 from bottom:  $F_\phi$  should read  $(rF_\phi)$ .
49. Page 273, Exercise 10.3. Replace the words “current density” by ”charge density” (two times).
50. Page 279, Line 4 after (11.9). Replace  $|a/z|$  by  $|z/a|$ .
51. Page 283,  $t$ -integral: include  $0 < c < \lambda$ .
52. Page 284, Line before (11.21): “non-negative” should read “non-positive”.
53. Page 285, Line -5: write  $u(t) = -i(t - 1)$ .
54. Page 289, Line before §11.3.1: “§11.3.6.” should read “§11.3.4”.
55. Page 298, Equation (11.60). Replace  $\pi$  by  $2\pi$  (two times).
56. Page 299, Equation (11.64). Replace  $e^{-x}$  by  $e^{-x-y}$ .
57. Page 301, Line before Equation (11.71). Replace  $s = 1$  by  $t = 1$ .
58. Page 304, Equation (11.81). Replace  $\sinh$ , by  $\sinh \gamma$ .
59. Page 315, Equation (12.1):  $0 \leq k < 1$ .
60. Page 315, Equation (12.2):  $0 \leq k \leq 1$ .
61. Page 321, Equations (12.15), (12.16), (12.17):  $\phi$  should be restricted to the interval  $[-\pi/2, \pi/2]$  and  $k$  as in (12.1) and (12.2). After (12.20) insert: “If  $n > 0$  and  $x^2 n > 1$  the integral in (12.20) should be interpreted as a Cauchy principal value integral.”
62. Page 325, Line -5, series for  $\theta_4$ : the exponential function should read  $e^{2niz}$ .
63. Page 346, Eq. (13.13): replace  $\frac{1}{2}$  by  $\frac{1}{s}$ .
64. Page 353. Include item: G. Gasper and M. Rahman (1990), *Basic hypergeometric series*, Cambridge University Press, London and New York.
65. Page 353. Include item: W. Gautschi (1994), Algorithm 726: ORTHPOL - A package of routines for generating orthogonal polynomials and Gaus-type quadrature rules, *ACM Trans. Math. Softw.*, **20**, 21 – 62.