Comments and Corrigenda
for ANALYTIC NUMBER THEORY
by Bateman and Diamond
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The authors would be grateful to receive further comments or corrections. Please send to Harold Diamond, `diamond@math.uiuc.edu`.

2004 Printing

Chapter 5

Page 95, 3 lines before Lemma 5.5. Change "$\alpha =$" to "$\alpha :=$"'

Chapter 6

Page 112, Example 6.3, Item (3). Change "$\Sigma 1 = \dots$" to "$1 = \dots$"

Page 109, line -8. Change ":=" to "=:"

Page 139, line -3. Change "$g =$" to "$g :=$"

Chapter 7

Page 156, line 7. Change "two inequalities" to "upper and lower bound estimates"

Page 158, line -2. After "Replacing $y + \delta$ by w" Insert: "in the estimate of the main contribution on the left side of (7.18),"

Page 175, 1 line after (7.24). Change "$f(u) =$" to "$f(u) :=$"

Chapter 8

Page 185, §8.1.1 While the Fourier series of the sawtooth function converges boundedly, the second factor occurring in (8.3), x^{-s-1} with $-1 < \Re s < 0$, is not bounded at the origin. Thus some further justification is needed for the termwise integration.

In §1.76 of Titchmarsh's Theory of Functions, it is shown that if a series is boundedly convergent and the other factor integrable (which it is here), then the exchange of sum and integral is justified.

Here is a direct proof for our situation. Let ϵ be a small positive number, and break the integrals in (8.3) at that point. Clearly the integrals over (ϵ, X) involve bounded functions as claimed. It remains to show the integrals of (8.3) taken over the interval $(0, \epsilon)$ are arbitrarily small for ϵ sufficiently small.

On the left side, of (8.3) we have

$$\int_0^\epsilon O(1)x^{-\sigma-1}dx \ll \epsilon^{-\sigma},$$

which is small for (fixed) small ϵ and negative σ.

On the right side of (8.3), we distinguish summands for which $n < 1/\epsilon$ from the larger values of n. For each of the smaller values of n, use the estimate $\sin 2\pi nx \ll nx$. By a crude estimate, the size of each integral is $\epsilon^{1-\sigma}$, and the number of such integrals is $\ll 1/\epsilon$, so this contribution is small.

For each $n > 1/\epsilon$, write

$$\int_0^\epsilon = \int_0^{1/n} + \int_{1/n}^\epsilon .$$

For the first integral on the right, use the same estimate as was applied in the last paragraph. For the last integral, use the estimate (8.4); that and the factor $1/(\pi n)$ yield a term having order $1/n^{1-\sigma}$, and this is summable to a small quantity.

Page 190, line -8. Insert at end of line: "by Stirling's formula again"

Chapter 10

Page 258, Note to §10.2. Replace

> "and A. Thue, Archiv for Mathematik og Naturvidenskab, vol. 34 (1917), no. 15; also in Selected Mathematical Papers, Universitetsforlaget, Oslo, 1977, pp. 555–559. The history of the theorem is given in some detail in the above-mentioned paper of Brauer and Reynolds."

by

> "and A. Thue, Christiania Vidensk. Selskabs Forhandlinger, 1902, no. 7; also in Selected Mathematical Papers, Universitetsforlaget, Oslo, 1977, pp. 57–75. This theorem is also frequently referred to as Thue's remainder theorem."

Chapter 11

Page 272, Insertion to clarify the first sentence of Theorem 11.12. Let F be a real valued function in $\mathcal{V}$ and satisfy $F(x) < \log^{\beta} x$ *for some* $\beta < 1$ *and all sufficiently large* x or $F(x) > -\log^{\beta} x$ for some $\beta < 1$ and all sufficiently large x.

Chapter 12

Page 312 Replace "12.3 was found ..." by "12.6 Lemma 12.11 was found ..."

Index of Names and Topics

Insert "Hadamard factorization theorem, 190"

Insert "A. F. Lavrik, 108"

Symbol Index

Page 359. Insert "$\sum := \sum_1^{\infty}$"