Note that the document on `http://www.math.uu.se/~astrombe/analtalt08/analtalt08.html` is always the most updated version.

1. Primes in Arithmetic Progressions

p.9: In proof of Remark 1.2, I corrected "Fermat's Little Theorem" into "Euler's Theorem".

p.9: In Remark 1.3, I corrected all "$q-1$" into "$\phi(q)$".

Note that formula (25) on p. 13 is correct as written; I got confused in class.

(Also note that regarding formulae (6) and (21), it is important to mention that we choose the *principal branch* of each logarithm in the right hand side; otherwise the right hand side would be just as multivalued as the left hand side. This is written in the notes, but I forgot to say it during my lecture.)

2. Infinite products

I added a 5-line parenthesis just below (52) to clarify a point which I managed to get confused over in class.

3. Partial summation and Dirichlet series

(During the lecture I claimed, in connection with Theorem 3.11, that

$$\limsup_{x\to\infty} \frac{\log|A(x)|}{\log x} = \inf\big\{\theta\in\mathbb{R} \,:\, |A(x)| \ll x^{\theta},\ \forall x\geq 1\big\}.$$

I've now added a Problem, 3.12, to prove this. Note this could be called an exercise belonging to "Foundations of real analysis".)

p.43, (114) and (116): Corrected by inserting a minus sign in the right hand side of each formula.

p.44, Problem 3.9: "$\sigma > 1 + \operatorname{Re}\alpha$" corrected to "$\sigma > \max(1, 1+\operatorname{Re}\alpha)$".

4. More on Dirichlet Characters

At the beginning of section 4 I added some recommended textbooks concerning the structure of $(\mathbb{Z}/q\mathbb{Z})^{\times}$ and quadratic reciprocity.

5. $L(1,\chi)$ and class numbers

p.97, just above (227): I added a reference to Theorem I.6.3 in Katznelson's book to justify the absolute convergence of the Fourier series.

p.97(227): The parenthesis should read "(with $\widehat{\varphi}(m) = \cdots$)" in place of the incorrect "(with $\varphi(m) = \cdots$)".

6. The distribution of primes

7. The prime number theorem

p.131, problem 7.4(a): "dx" corrected to "ds" in the integral formula for $M_1(x)$.

8. The Γ-function; Integral functions of order 1

p.133, lines 7-8: replaced "$\log B + R_m^\alpha$" with "$\max(0, \log B + R_m^\alpha)$". This is to make the statements correct also if $\log B + R_m^\alpha < 0$. (Note that this does not cause any changes in the later discussion where we let $m \to \infty$, for then $R_m \to \infty$, and thus eventually we have $\max(0, \log B + R_m^\alpha) = \log B + R_m^\alpha$.)

p.134, end of proof of Prop. 8.3: We should write lower limit "0+" in place of 0 in the first integral, to make it well-defined according to Definition 3.1 (and Def 3.2); the problem is that the requirement $g \in C([A, B])$ is not true for $g(r) = \log(R/r)$ and $[A, B] = [0, R]$! The computation is correct with "0+" since we anyway have $n(r) = 0$ for r sufficiently small.

p.136, two lines above (306): Perhaps slightly more appropriate to write "the intervals $[r_n - r_n^{-\alpha}, r_n + r_n^{-\alpha}]$" in place of "the intervals $(r_n - r_n^{-\alpha}, r_n + r_n^{-\alpha})$" (although the total length of course is the same for both cases).

p.137, lines 2-5: The claim "$\big|P_2(z)\big| \geq \big(C_5 R^{-1-\alpha}\big)^{C_6 R^\alpha}$" would in general be false if $C_5 > 1$. I've fixed this by assuming $C_5 < 1$ in line 3, and also added a footnote discussing the deduction.

p.144, last line: Sign corrected in the Taylor expansion.

p.147, (330): In the last integral, "$F^{(h)}(x)$" should be "$f^{(h)}(x)$".

9. The functional equation

10. The infinite products for $\xi(s)$ and $\xi(s, \chi)$

p.161, in the proof of Proposition 10.1, I removed the false claim that "$\zeta(s)$ is bounded in the compact rectangle $\{\frac{1}{2} \leq \sigma \leq 2,\ |t| \leq 1\}$". Note that the conclusion in the next sentence, that $\big|\zeta(s)\big| \leq e^{C_3|s|}$ for $\sigma \geq \frac{1}{2}$ and $|s|$ large, is still valid.

11. Zero-free regions for $\zeta(s)$ and $L(s, \chi)$

p.176, (411): "$0 < \gamma < \cdots$" corrected to "$0 \leq \gamma < \cdots$".

12. The numbers $N(T)$ and $N(T, \chi)$

13. The explicit formula for $\psi(x)$

p.209, (474): Two "1" corrected to "$\log x$". Also in (475) and in line 2 of Remark 13.2, "1" has been corrected to "$\log x$".

14. The explicit formula for $\psi(x, \chi)$

15. The prime number theorem for Arithmetic Progressions (I)

16. Siegel's Theorem

17. The Polya-Vinogradov Inequality

18. Further prime number sums

p.249, (579): The second summation corrected to "$\sum_{M < m \leq \min(N/V, 2M)}$" (viz., one "$M$" corrected to "$2M$").