There are three appendices: (1) Elementary properties of symmetric matrices over fields. (2) The geometry of metric spaces as another expression of the theory of quadratic forms. (3) Modules and ideals in quadratic fields $\mathbf{Q}(\sqrt{\Delta})$ and their norm forms. This is helpful for the understanding of the Euler products occurring in Chapter Four.

REFERENCES

1. M. Eichler, *Quadratische Formen und orthogonale Gruppen*, 2nd ed., Springer-Verlag, Berlin, Heidelberg, New York, 1974.

2. ——, *Einführung in die Theorie der Algebraischen Zahlen und Funktionen*, Birkhäuser-Verlag, Basel and Stuttgart, 1963=*Introduction to the theory of algebraic numbers and functions*, Academic Press, New York and London, 1966.

3. E. Freitag, *Siegelsche Modulfunktionen*, Springer-Verlag, Berlin, Heidelberg, New York, 1983.

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Arithmetic functions and integer products, by P. D. T. A. Elliott. Grundlehren der Mathematischen Wissenschaften, vol. 272, Springer-Verlag, New York, Berlin, Heidelberg and Tokyo, 1985, xv + 461 pp., $64.00. ISBN 0-387-96094-5

Introduction to arithmetical functions, by Paul J. McCarthy, Springer-Verlag, New York, Berlin, Heidelberg and Tokyo, 1986, vi + 365 pp., $35.50. ISBN 0-387-96262-X

1. The theory of numbers: its great conjectures. Problems in number theory have fascinated generations of professional and amateur scientists. Still today mathematicians are attracted to number theory because its history has brought so many conjectures. Some, like the Riemann Hypothesis, stated in 1859 (see §2), and the Goldbach conjecture, which goes back to 1742 (see §6), have yet to be proven. Others, thanks to the ingenuity of contemporary mathematicians or to highly sophisticated computer methods, have been resolved: such is the case of the Mertens conjecture (see §5), which was proven false by Odlyzko and te Riele [**39**] in 1983, some 86 years after it was stated.

Many problems in number theory involve arithmetical functions. Our intent here is to present a survey of (what we feel are) the most significant results in the theory of arithmetical functions, thereby leading us into a review of the books of McCarthy and Elliott. Though our presentation obviously cannot be exhaustive, our objective is to display most of the classical arithmetical functions (those which "made history") and to introduce the reader to the methods used by mathematicians to analyze their behavior. The two books under review are mainly concerned with results and methods in elementary and analytic number theory, though the second assumes some knowledge of probabilistic number theory; thus our survey will reflect the development of arithmetical functions only in these three areas.