

16. G. C. Rota, *An "Alternieren de Verfahren" for general positive operators*, Bull. Amer. Math. Soc. **68** (1962), 95–102.
17. D. Spencer, *A function theoretic identity*, Amer. J. Math. **65** (1943), 147–160.
18. E. M. Stein, *On the functions of Littlewood-Paley, Lusin and Marcinkiewicz*, Trans. Amer. Math. Soc. **88** (1958), 430–466.
19. E. M. Stein and Guido Weiss, *On the theory of harmonic functions of several variables*, Acta Math. **103** (1960), 25–62.
20. E. M. Stein, *Classes H^p , multiplicateurs et fonctions de Littlewood-Paley*, C. R. Acad. Sci. Paris **263** (1966), 716–719.
21. ———, *Singular integrals and differentiability properties of functions*, Princeton Univ. Press, Princeton, N.J., 1970.
22. ———, *Topics in harmonic analysis related to the Littlewood-Paley theory*, Ann. Math. Studies, no. 63, Princeton Univ. Press, Princeton, N.J., 1970.
23. ———, *Maximal functions: Spherical means*, Proc. Nat. Acad. Sci. U.S.A. **73** (1976), 2174–2175.
24. M. H. Taibleson, *On the theory of Lipschitz spaces of distributions on Euclidean n -spaces. I*, J. Appl. Math. Mech. **13** (1964), 407–480; II (ibid) **14** (1965), 821–840.
25. ———, *Fourier analysis on local fields*, Math. Notes, no. 15, Princeton Univ. Press, Princeton, N.J., 1975.
26. A. Zygmund, *Une remarque sur un théorème de M. Kaczmarz*, Math. Z. **25** (1926), 297–298.
27. ———, *Trigonometric series*, Cambridge Univ. Press, New York, 1959.

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Trigonometrical sums in number theory, by I. M. Vinogradov, Statistical Publishing Society, first published: October 1975, Calcutta, viii + 151 pp., \$15.00.

1. Introduction. The theory of trigonometric (sometimes called exponential) sums is so intimately associated with I. M. Vinogradov that a book by this master is a noteworthy event.

The book under review is a translation from the Russian edition of 1970 which, in its turn, is described as a revised edition of Vinogradov's 1947 book of the same title. "Revised edition", however, is a misnomer, since a comparison with the 1947 edition shows that the present work is a complete rewriting and incorporates new refinements and improvements—results mostly due to the author himself.

Trigonometric sums have been used in one form or another in number theory since Gauss's solution of the cyclotomic equation in which he introduced "Gaussian" sums. These led to a highly interesting and somewhat unexpected proof of the quadratic law of reciprocity. There are many other examples and applications. The applications given in this book deal with the Waring problem, the distribution of the fractional parts of polynomials and with the Waring-Goldbach problem. Reference is also made to the applications to the zeta function.

2. The problem of trigonometric sums. The integers are naturally embedded in the complex numbers but a useful point of view for number theory-