

THE  
THEORY OF  
DETERMINANTS  
in the  
HISTORICAL ORDER  
OF DEVELOPMENT

VOLUME FOUR  
THE PERIOD 1880 TO 1900.

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## PREFACE.

WITH the issue of this volume, dealing with the period 1880–1900, my effort to present a historical account of the Theory of Determinants up to the close of the nineteenth century comes to an end. May it give to present and future students all the help which some such book would certainly have given to me half a century ago.

The work connected with the preparation of the volume has been more than ordinarily onerous. Considerably over 800 writings of one kind and another have had to be dealt with, that is to say, about a half more than in the case of the third volume. In view of the fact that each volume deals with a twenty-year period, the increase thus indicated in the attention given to the study of determinants is most striking, even when one makes allowance for the considerably increased facilities for publication during the latter period.

On first thoughts the bulk of the fourth volume ought, therefore, to be about a half more than that of the third; but then we have to reflect that the increased number of students and the increased facilities referred to are not accompanied by the like increase of original matter. It is only that workers rush into print a little more hastily than formerly, and that scientific societies and editors do not always scrupulously exert themselves to withstand the rush,—a state of matters that after all may be well-ordered in the interest of instruction and the spread of knowledge. Be this as it may, it is an undoubted fact that the number of writings which the

chronicler of scientific progress can without unkindness dismiss in a sentence grows apace. All that can be fairly expected of him is to try his hardest to be just in his judgments, and, in the interest of his readers, to guard against hurtful condensation.

The bibliographical basis of the work, as is probably now well known among students of the subject, is the six Lists of Writings published in the *Quarterly Journal of Mathematics* at intervals from 1881 to 1916. A seventh List was added in 1920.\* Since in the compiling of every one of these lists after 1900 writings belonging to the preceding century continued to be carefully sought for, it is hoped that little matter of any serious importance has been passed over that was needed for the History.

Although the number of chapters is the same as in the third volume, the distribution of subjects is somewhat different. 'Text-books' have been separated from other writings on general determinants and given a chapter to themselves. The presence of a second new chapter is due to the inclusion of a new subject 'Determinants having Invariant-factors.' On the other hand, there is no longer a chapter on 'Zero-axial determinants' nor on 'Determinants of Combinatory Numbers.' The writings on these subjects having greatly fallen off in number and importance, the few of them calling for some slight attention have been included in the chapter on 'Less common special forms.'

Of the contents of the volume only an exceedingly small fraction has seen the light before, namely, a portion of the chapter (xvi.) on Circulants.†

RONDEBOSCH, SOUTH AFRICA,  
6th April, 1922.

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\* *Quart. Journ. of Math.*, xlix. pp. 51-73.

† *Proc. R. Soc. Edinburgh*, xxxvi. (1915) pp. 151-173.

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