TREATISE ON DIFFERENTIAL EQUATIONS. SUPPLEMENTARY VOLUME

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GEORGE BOOLE

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PREFACE.

THE present volume contains all that Professor Boole wrote for the purpose of enlarging his Treatise on Differential Equations. Had he lived to publish the second edition he would doubtless have incorporated his more recent investigations with the original work, and it is therefore necessary to explain why another plan has been adopted.

In some cases Professor Boole had indicated that certain portions of the original work were to be omitted and their places supplied from the manuscripts; but on examination it appeared that in subsequent passages of the work there were references and allusions to the portions thus marked to be omitted which would not apply to the substituted matter. Thus in attempting to carry out the directions it would have been necessary to accept the responsibility of making many alterations, and consequently to incur the risk of failing in the attempt to improve the original form.

Moreover the Treatise had been for some time out of print, and the long delay which must have been caused by the labour of reconstruction would have produced serious inconvenience to students at Cambridge and elsewhere. Professor Boole himself was always especially anxious to consult

the advantage of students, and those who had the charge
of his manuscripts were naturally inclined to adopt a course
of which they believed he would himself have approved.

The design of reconstructing the Treatise was therefore
abandoned; and it was resolved that the original volume
should be reprinted, and that the manuscripts should be
collected and published separately. This plan has the ob-
vious recommendation of enabling those who are already
familiar with the original work to turn their attention
readily to the new investigations. It will be seen that
many of the Chapters of the present volume may be re-
garded as independent essays or memoirs which lose nothing
by being separated from the other volume; and indeed no
indications had been left by Professor Boole of the place
which such Chapters were to occupy in the enlarged edition.

I have printed all the unpublished matter relating to
Differential Equations which I found among Professor Boole's
papers. In a few cases it will be seen that an investigation
is incomplete; such investigations have however been in-
cluded in the volume, because I was unwilling that anything
should be lost which so great a mathematician had written
on a subject he had long and carefully studied.

I trust that no serious error will be found in the volume,
and that any faults which may be detected will be excused
on account of the nature and difficulty of the task that had
to be performed. Many of the manuscripts had not been
finally revised; some of them were very obscure and had
to be carefully and laboriously copied for the press. In
general the equations were not numbered, and thus only

blanks occurred in place of references; this circumstance often caused great trouble and perplexity: I hope however that a satisfactory result has been finally attained.

I may state for the benefit of those who are conversant with the first edition of the original work that the theorem which in the present volume is cited as contained in Chap. II. Art. 1 will be found in Chap. IV. Art. 2 of the first edition: the change was made by the direction of Professor Boole's interleaved copy. It was judged convenient to number the Chapters in the present volume in continuation of those in the original work.

All additions of my own are enclosed within square brackets. The sheets have been read by the Rev. J. Sephton, Fellow of St John's College, as well as by myself, and the volume is much indebted to his care and accuracy. Obvious mistakes in the manuscripts were of course corrected; thus, for example, the table at the end of the volume was calculated by Mr Sephton, because the table in the manuscript was rendered erroneous by the use of a wrong sign in a formula.

I. TODHUNTER.

St John's College,
November, 1865.

LIST OF PROFESSOR BOOLE'S WRITINGS.

In the Philosophical Transactions.

On a General Method in Analysis, 1844, pages 225...282.

On the Comparison of Transcendents, with certain applications to the Theory of Definite Integrals, 1857, pages 745...803.

On the Theory of Probabilities, 1862, pages 225...252.

On Simultaneous Differential Equations of the First Order in which the Number of the Variables exceeds by more than one the Number of the Equations, 1862, pages 437...454.

On the Differential Equations of Dynamics. A sequel to a Paper on Simultaneous Differential Equations, 1863, pages 485...501.

On the Differential Equations which determine the form of the Roots of Algebraic Equations, 1864, pages 733...755.

In the Transactions of the Royal Irish Academy.

On the Analysis of Discontinuous Functions. Vol. 21, 1848, pages 124...139.

On a certain Multiple Definite Integral. Same Vol., pages 140...149.

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On the Application of the Theory of Probabilities to the Question of the Combination of Testimonies or Judgments. Vol. 21, 1857, pages 597...653.

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Researches on the Theory of Analytical Transformations, with a special application to the Reduction of the General Equation of the Second Order. Vol. 2, 1841, pages 64...73.

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On the Integration of Linear Differential Equations with Constant Coefficients. Same Vol., pages 114...119.

Analytical Geometry. Same Vol., pages 179...188.

Exposition of a General Theory of Linear Transformations. Vol. 3, 1843, pages 1...20, 106...119.

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Remarks on a Theorem of M. Catalan. Same Vol., pages 277...283.

On the Transformation of Multiple Integrals. Vol. 4, 1845, pages 20...28.

On the Inverse Calculus of Definite Integrals. Same Vol., pages 82...87.

Notes on Linear Transformations. Same Vol., pages 167...171.

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In the Cambridge and Dublin Mathematical Journal.

On the Equation of Laplace's Functions. Vol. 1, 1846, pages 10...22.

On the Attraction of a Solid of Revolution on an External Point. Vol. 2, 1847, pages 1...7.

On a certain Symbolical Equation. Same Vol., pages 7...12.

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The Calculus of Logic. Same Vol., pages 183...198.

On a General Theorem of Definite Integration. Vol. 4, 1849, pages 14...20.

On the Theory of Linear Transformations. Vol. 6, 1851, pages 87...106.

On the Reduction of the General Equation of the nth Degree. Same Vol., pages 106...113.

Letter to the Editor of the Journal. Same Vol., pages 284, 285.

Proposed Question in the Theory of Probabilities. Same Vol., page 286.

On Reciprocal Methods in the Differential Calculus. Vol. 7, 1852, pages 156...166, and Vol. 8, 1853, pages 1...24.

*In the London, Edinburgh, and Dublin Philosophical Magazine...
Third Series.*

Remarks on the Rev. B. Bronwin's Method for Differential Equations. Vol. 30, 1847, pages 6...8.

Note on a Class of Differential Equations. Same Vol., pages 96, 97.

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Solution of a Question in the Theory of Probabilities. Vol. 7, 1854, pages 29...32.

Reply to some Observations published by Mr Wilbraham in the Philosophical Magazine, Vol. 7, p. 465, on the Theory of Chances developed in Professor Boole's 'Laws of Thought.' Vol. 8, 1854, pages 87...91.