

**DIFFERENTIAL AND
INTEGRAL CALCULUS:
WITH APPLICATIONS**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649562428

Differential and Integral Calculus: With Applications by Alfred George Greenhill

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

ALFRED GEORGE GREENHILL

**DIFFERENTIAL AND
INTEGRAL CALCULUS:
WITH APPLICATIONS**

DIFFERENTIAL AND INTEGRAL
CALCULUS.



DIFFERENTIAL AND INTEGRAL
CALCULUS,

34761

WITH APPLICATIONS.

BY

Sir
ALFRED GEORGE GREENHILL, M.A.,

PROFESSOR OF MATHEMATICS TO THE SENIOR CLASS OF ARTILLERY OFFICERS, WOOLWICH;
EXAMINER IN MATHEMATICS IN THE UNIVERSITY OF LONDON.

London:

MACMILLAN AND CO.

1886.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that this is essential for ensuring transparency and accountability in the organization's operations.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It highlights the need for consistent and reliable data collection processes to support effective decision-making.

3. The third part of the document focuses on the role of technology in modern data management. It discusses how advanced software solutions can streamline data collection, storage, and analysis, leading to more efficient and accurate results.

4. The fourth part of the document addresses the challenges associated with data security and privacy. It provides guidance on implementing robust security measures to protect sensitive information from unauthorized access and breaches.

5. The fifth part of the document explores the importance of data quality and integrity. It discusses strategies for identifying and correcting errors in data, ensuring that the information used for analysis is accurate and reliable.

6. The sixth part of the document discusses the role of data in strategic planning and performance management. It explains how data-driven insights can help organizations identify trends, opportunities, and areas for improvement, leading to more informed and effective strategic decisions.

7. The seventh part of the document focuses on the importance of data governance and compliance. It discusses the need for clear policies and procedures to ensure that data is collected, stored, and used in a manner that complies with relevant laws and regulations.

8. The eighth part of the document discusses the role of data in customer relationship management (CRM). It explains how data can be used to better understand customer needs and preferences, leading to more personalized and effective customer service and marketing efforts.

9. The ninth part of the document discusses the importance of data in human resources management. It explains how data can be used to track employee performance, identify training needs, and make more informed decisions about hiring and retention.

10. The tenth part of the document discusses the role of data in financial management. It explains how data can be used to track financial performance, identify areas for cost reduction, and make more informed decisions about investment and budgeting.

Recd 09-29-23 C.C.

CONTENTS.

CHAP.	PAGE.
I.—DIFFERENTIATION,	1
Algebraical and Circular Functions. Geometrical Illustrations. Exponential, Logarithmic, and Hyperbolic Functions. Differentiation of a Sum, Product and Quotient. Logarithmic Differentiation. Examples.	
II.—INTEGRATION,	59
Rational Algebraical Functions. Circular and Hyperbolic Functions. Corrected and Definite Integrals. Quadrature and Centroids. Rectification. Volumes and Surfaces. Theorems of Pappus. Integration by Parts. Formulæ of Reduction. Reduction of Integrals. Examples.	
III.—SUCCESSIVE DIFFERENTIATION,	129
Theorem of Leibnitz. Dynamical Applications. Curvature. Evolutes and Involutives. Harmonic Vibration. Maxima and Minima.	
IV.—EXPANSION OF FUNCTIONS,	189
Theorems of Taylor and Maclaurin, and applications. Indeterminate Forms. Fourier's Series.	
V.—PARTIAL DIFFERENTIATION,	217
Functions of two or more Independent Variables. Double Integration. The Planimeter. Quantics. Euler's Theorems. Green's Theorem.	

VI.—CURVES IN GENERAL,	238
Polar Curves. Pedal Curves. Roulettes. Steiner's Theorems. Inverse and Polar Reciprocal Curves. Peaucellier's and Hart's Parallel Motions. Conjugate Functions and Oblique Trajectories. Curve Tracing.	
APPENDIX,	266
INDEX,	269

ERRATA.

Page 1, line 5 from bottom,—for “ $(lx+h)$ ” read $f(x+h)$.

Page 106, line 9 from bottom—

$$\text{for } "n \int (\sin x)^n dx = -(\sin x)^{n-2} \cos x + (n-1) \int (\sin x)^{n-2} dx."$$

$$\text{read } n \int (\sin x)^n dx = -(\sin x)^{n-1} \cos x + (n-1) \int (\sin x)^{n-2} dx.$$

Page 128, Ex. 25, read—

$$(Ax^2 + 3Bx^2 + 3Cx + D)(Ay^2 + 3By^2 + 3Cy + D)(Az^2 + 3Bz^2 + 3Cz + D) \\ = \{Axyz + B(yz + zx + xy) + C(x+y+z) + D\}^2;$$

$$\text{and } \int (Ax^2 + 3Bx^2 + 3Cx + D)^{-1} dx + \dots$$

PREFACE.

THE present Treatise is intended as an introduction to the study of the Differential and Integral Calculus, but will be found to contain what is necessary to know in order to pass on to the subjects which presume a knowledge of the Calculus.

I have endeavoured to make this book suitable not only for the mathematical student, but also for men like engineers and electricians who require the subject for practical applications, to whom even a slight knowledge of the notation and methods of the Calculus is becoming more and more indispensable.

Hitherto in this country the influence of Newton, although the inventor of Fluxions, has been employed to delay the study of this subject, and make a knowledge of it the privilege of a select few; my object in writing this treatise has been mainly to present the subject in as simple a manner as possible, in order to encourage a larger number of students to cultivate it.

In order, however, to keep the size of the book within reasonable limits, it is assumed that the reader has already acquired a knowledge of the elements of the subject of Algebra, Trigonometry, and Co-ordinate