CAMBRIDGE TRACTS IN MATHEMATICS AND MATHEMATICAL PHYSICS. NOS.: 2. THE INTEGRATION OF FUNCTIONS OF A SINGLE VARIABLE; 12. ORDERS OF INFINITY. THE 'INFINITARCALCUL' OF PAUL DU BOIS-REYMOND; 18. THE GENERAL THEORY OF DIRICHLET'S SERIES Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649614578

Cambridge Tracts in Mathematics and Mathematical Physics. Nos.: 2. The Integration of Functions of a Single Variable; 12. Orders of Infinity. The 'Infinitärcalcül' of Paul Du Bois-Reymond; 18. The General Theory of Dirichlet's Series by G. H. Hardy & Marcel Riesz

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

G. H. HARDY & MARCEL RIESZ

CAMBRIDGE TRACTS IN MATHEMATICS AND MATHEMATICAL PHYSICS. NOS.: 2. THE INTEGRATION OF FUNCTIONS OF A SINGLE VARIABLE; 12. ORDERS OF INFINITY. THE 'INFINITARCALCUL' OF PAUL DU BOIS-REYMOND; 18. THE GENERAL THEORY OF DIRICHLET'S SERIES

Trieste

Cambridge Tracts in Mathematics and Mathematical Physics

GENERAL EDITORS J. G. LEATHEM, M.A. G. H. HARDY, M.A., F.R.S.

٠

No. 2

The Integration of Functions of a Single Variable

CAMBRIDGE UNIVERSITY PRESS

5.000

......

C. F. CLAY, MANAGER Loudon: FETTER LANE, E.C. Edinburgh: 100 PRINCES STREET



Sein Fork: G. P. PUTNAM'S SONS Bombap, Calcuits and Matras: MACMILLAN AND CO., LTD. Ecuanto: J. M. DENT AND SONS, LTD. Unkgo: THE MARUZEN-KABUSHIKI-KAISHA

i.e

All rights reserved

THE

INTEGRATION OF FUNCTIONS OF A SINGLE VARIABLE

by

G. H. HARDY, M.A., F.R.S.

Fellow and Lecturer of Trinity College and Cayley Lecturer in Mathematics in the University of Cambridge

2.

325

SECOND EDITION

Cambridge: at the University Press 1916 JBD

PREFACE

THIS tract has been long out of print, and there is still some demand for it. I did not publish a second edition before, because I intended to incorporate its contents in a larger treatise on the subject which I had arranged to write in collaboration with Dr Bromwich. Four or five years have passed, and it seems very doubtful whether either of as will ever find the time to carry out our intention. I have therefore decided to republish the tract.

The new edition differs from the first in one important point only. In the first edition I reproduced a proof of Abel's which Mr J. E. Littlewood afterwards discovered to be invalid. The correction of this error has led me to rewrite a few sections (pp. 36-41 of the present edition) completely. The proof which I give now is due to Mr H. T. J. Norton. I am also indebted to Mr Norton, and to Mr S. Pollard, for many other criticisms of a less important character.

G. H. H.

January 1916.

CONTENTS

		Intro	. . .		225													PAGE
	I.	Intro	οαι	ictic	n, n		۰	29	ŧ.	8		88) <u>(</u> 2)	1	0.027	•	1
	II.	Elen	nen	tar	fur	nctio	ns	and	thei	r cla	assi	fica	tion	<u>ت</u> :	×.			3
	ш.	The	in	tegr	ation	o of	ole	men	tary	fun	ctio	8,	Sum	mary	of	results	į.	8
	1V.	The	in	tegr	ation	ı of	rat	iona	l fur	etio	138							12
		1-3.	7	The	met	hod	of	parti	ial fi	acti	ona		3552	10				12
		4.	1	ler	nite's	а m	ethe	nd of	f int	egra	tion		8 .			1992		15
		5.	1	Part	icula	r p	roble	ems.	of it	iteg	rati	a	12002	÷.	ж.	8	ŝ	17
		6.	7	The	limi	tati	nns	of t	he n	neth	ode	of	integr	ation	10	(39) 1	2	19
		7.	(lone	lusio	m	8		53	,			1.55		12		2	21
	v.	The	in	tegr	ation	1 of	alg	ebra	ical	fund	tion	ЪH	220	1	ii.	8		22
		1.	1	lge	braic	al 1	func	tion	9.				19 00	20 20	200 100	19		22
		2.	I	nte	gratio	on l	oy r	atio	nalis	atio	1.	In	tegrals	-	cia	ted wit	sh	
				cc	nica			- 12		,			1893		a.	8.8		23
崇		3-6.		Гће	inte	gral	j R	:{x,	J(aa	* +	26x	+	c)] dx	85	÷	120	*	24
		7.	1	Jnic	ursa	l pl	ane	our	ves	30				\mathbf{E}	×		÷	30
		8.	F	art	icula	r ci	803		23	X		æ	13	$\tilde{\mathbf{x}}$	50	84	ŝ	33
		9.	τ	Juic	ursa	l cu	rves	a in	apac	e :		4	-45	¥2	1		ŝ	35
		10,	1	nte	grals	of	alge	brai	cal f	unot	tion	H jı	n gene	ral	8	•		35
	1	1-14.	7							100.00			CL (* 1990) **		al	functio	n.	
					. ×								algebra	AICAI		۲	•	36
		15.						7 21 4 5 1						•				42
		16.							f e*	and	108	g ar	1993	83	25		8	
		17.			ace's	100	1997 - A	- 10 A						6 .	х,		٠	44
		18.	1		u											function function		
				1.0	nd lo		S						99. ang 1997		1		*	45

CONTENTS

	- 2017 - 2012 - 1017 - 101 - 2011 - 2011 - 2011 - 2012 - 2017 - 2017 - 2017	47
	20. Curves of deficiency 1. The plane cubic	48
		50
	22. The classification of elliptic integrals	51
VI.	The integration of transcendental functions	52
		52
		52
	3. The integral $\int P(x, e^{ax}, e^{bx},) dx$	55
	4. The integral $\int e^x R(x) dx$. The logarithm-integral	56
	5. Liouville's general theorem	59
		60
	7. Conclusion	62
	Appendix I. Bibliography	63
	Appendix II. On Abel's proof of the theorem of $v_{\cdot, \gamma} \ge 11$	66

35

.

1

viii

83