

Calculus for Scientists and Engineers

ERRATA as updated on August 23, 2006

In Exercise (3.1) on p. 8, remove the clause, ‘while at the beginning of 1980, it was 1.5 times that of B ’.

The proof of Theorem (4.9.2) given on page 263 needs a correction. After getting (4), we need Theorem (9.3) below to conclude that $\lim_{x \rightarrow c} \frac{g(x)}{h(x)}$ also equals $\frac{g^{(n-1)}(c)}{h^{(n-1)}(c)}$. The error causes little harm since Theorem (9.3) does not need Theorem (9.2).

In line 17 on p. 320, replace the words ‘Going back to the title question’ by ‘Comparing the two methods’.

In Figure 5.1.1 (a) on page 326, replace the upper label R_m by R_M . (Leave the lower label R_m as it is.)

Some other corrections, mostly typographical, are tabulated below. (A negatively numbered line is to be counted from the bottom.) A reader who notices any other mistake is urged to contact the author immediately, preferably on the e-mail (kdj@math.iitb.ac.in) or on the phone (022) 25767467, (022) 2576 8467. The errata will be displayed on the personal home page of the author (www.math.iitb.ac.in/~kdjoshi/book.html) and will be updated from time to time. Alternate solutions are also welcome. Those that are particularly elegant or instructive will be displayed on this webpage along with the names of their first contributors (except when they request anonymity).

Page No.	Line No.	incorrect	correct
1	7	programmes	programs
2	-8	are weighing	one weighing
4	13	mathamatical	mathematical
4	-22	statemnet	statement
6	2	mathemmmatics	mathematics
7	-7	some	same
9	-16	gemostry	geometry
10	15	Shakespear	Shakespeare
13	3	obsensible	ostensible
15	4	each of other	each other
15	8	trigonometrical	trigonometrical
17	-5	eqilateral	equilateral
17	-1	dulcect	dulcet
22	-9	clumsiensess	clumsiness
24	footnote	constructioning	constructing
25	-18, -17, -14	euclidean	euclidean
30	-4	p' and q	p and q'
34	11	pendantic	pedantic
34	-8	pedogogical	pedagogical
35	-15	postive	positive
38	-2	phenomenol	phenomenal
39	5	quesiton	question
39	20	construciton	construction
39	-15	insruments	instruments
40	3	quesiton	question
40	-14	mathematicain	mathematician
40	-12	mroe	more
40	-12	assidously	assiduously

(continued ...)

Page No.	Line No.	incorrect	correct
41	12	trignometry	trigonometry
42	15	expension	expansion
42	16	X	x
43	12	componding	compounding
43	16	instanstaneous	instantaneous
44	9	asnwer	answer
44	11	ingeneous	ingenious
44	11	foumula	formula
44	15	becaue	because
45	6	claculus	calculus
45	-15	will	will
47	-11	prvoe	prove
48	-7	approximate	approximate
50	6	exmaples	examples
50	11	poistive	positive
50	-5	interpretation	interpretation
50	-1	$\left(1 + \frac{1}{10}\right)^n$	$\left(1 + \frac{1}{10n}\right)^n$
51	4	infinitely	infinity
51	-12	Exress	Express
52	-10	between	between
52	-2	denisty	density
54	11	infiniesmimally	infinitesimally
54	-11	It x	If x
55	7	' x tends to c	' x tends to c '
59	10	$g(x) = -M$	$g(x) - M$
60	-4	complates	completes
61	-16	entirity	entirety
64	2	philooptical	philosophical
65	-14	from from	from
66	5	reciporcal	reciprocal

(continued ...)

Page No.	Line No.	incorrect	correct
67	-1	regadless	regardless
68	4	interpretations	interpretations
68	5	neighboudhood	neighbourhood
70	-9	from abvoe	from above
71	18	2.7	2.6
71	-13	Thoerem:	Theorem:
71	-2	simiarly	similarly
74	-5	infininitely	infinitely
75	5	acquaintence	acquaintance
75	7, 8	embarass	embarrass
75	9	embarassment	embarrassment
76	8	Figrue	Figure
77	-11	truns	turns
77	-9	ratinoal	rational
78	16	completness	completeness
78	-3	boundes	bounds
79	3	ocourse	course
79	-13	verions	versions
79	-7	Theroem:	Theorem:
80	8	Completenes	Completeness
80	9	immediate	immediate
80	-7, -5	limtis	limits
80	-5	unqiueness	uniqueness
81	-8	reamining	remaining
81	-7	theroem	theorem
81	-7	limtis	limits
83	-16	concetps	concepts
84	-16	ined	indeed
84	-9	constrution	construction
84	-8	non-collinear	non-collinear
87	3	differnce	difference

(continued ...)

Page No.	Line No.	incorrect	correct
93	-9	occurence	occurrence
93	-8	pedagoical	pedagogical
95	1	hpothesis	hypothesis
95	10	detered	deleted
96	3	ubiquitons	ubiquitous
97	footnote	Finte	Finite
99	9	preceeded	preceded
99	11	preceeded	preceded
102	-17	conveninet	convenient
102	-1	whithout	without
103	15	willl	will
106	7	thereom	theorem
107	6	postive	positive
107	7	Theroem	Theorem
107	10	postive	positive
107	-13	conveneient	convenient
110	5	becacause	because
111	1	theorem (2.3)	Theorem (3.4)
112	1	incerdibly	incredibly
113	-16	constatnt	constant
113	-15	orignally	originally
113	-11	popoular	popular
114	3	prvoe	prove
114	17	hyperholic	hyperbolic
114	-7	gien	given
114	-6	irrational	irrational
115	4	numer	number
115	-15	discoveres	discoverers
120	-11	vaues	values
121	6	infintely	infinitely
123	6	eixsts	exists

(continued ...)

Page No.	Line No.	incorrect	correct
126	-17	evey	every
130	-15	sereis	series
130	-11	serveral	several
130	-5	reciprcals	reciprocals
130	-6	evey	every
133	6	postive	positive
133	12	mutlply	multiply
135	6	corllary	corollary
135	12	vaules	values
135	-6	Clealry	Clearly
136	-14	defintion	definition
136	-14	consits	consists
136	-8	prdoduct	product
136	-2	inifinite	infinite
139	17	'rowwise'	'row-wise'
139	17	columnwise	column-wise
141	-6	succintly	succinctly
147	-9	onvergent	convergent
150	-10	analogus	analoguous
155	6	involvels	involves
162	-7	continiuty	continuity
166	-12	witn	with
168	7	radius	radius
172	-14	this own	his own
173	12	notatoin	notation
174	16	givn	given
175	14	Intitutively	Intuitively
177	-6	fintie	finite
179	2	eariser	easier
179	-14	whcih	which
180	-2	unifromly	uniformly

(continued ...)

Page No.	Line No.	incorrect	correct
181	-15	continously	continuously
183	3	suprising	surprising
183	-14	continous	continuous
184	-10	asume	assume
185	16	stretchng	stretching
186	-6	discontinous	discontinuous
187	-17	similar	similar
189	14	occurring	occurring
189	-16	arificial	artificial
191	15	esasiest	easiest
192	18	evey	every
194	-8	conincides	coincides
189	14	occurring	occurring
195	7	unifrom	uniform
196	15	Defintion	Definition
199	8	implications	implications
202	8	philosophical	philosophical
202	-7	piont	point
203	-7	approximation	approximation
204	10	approxiamtion	approximation
204	15	piont	point
204	-10	contunity	continuity
205	-6	correponds	corresponds
206	-16	deriative	derivative
210	-4	$h'(x)$	$h'(x)$
211	-3	rigourous	rigorous
213	4	opeartor	operator
214	1	writting	writing
214	-11	intergrals	integrals
215	3	expressed	expressed

(continued ...)

Page No.	Line No.	incorrect	correct
215	11	subsitution	substitution
215	-9	funciton	function
216	4	idnuccion	induction
216	-12	continous	continuous
217	11	indentically	identically
217	15	acceptablity	acceptability
217	-3	rigourous	rigorous
219	7	imporant	important
219	-18	identially	identically
220	-7	say, $[a, b]$,	say, $[a_1, b_1]$,
221	-9	Theoem	Theorem
224	-6	$(a.b)$	(a, b)
224	-3	$g(b) \neq g(a)$	g' never vanishes in (a, b)
226	7	funciton	function
226	9	funciton	function
226	-15	thereoems	theorems
227	4	picewise	piecewise
227	-10	continuuity	continuity
230	6	fuction	function
230	-15	limtis	limits
232	6	assumpiton	assumption
232	9	polint	point
233	2	speceical	special
233	6	percepient	percipient
234	7	manipluations	manipulations
235	-3	aproximation	approximation
238	1	sucessively	successively
238	-12	Interprete	Interpret
239	-2	Exericse (9.8)	Exercise (9.8)
240	14	Pythagorus	Pythagoras
240	-5	corelate	correlate

(continued ...)

Page No.	Line No.	incorrect	correct
241	-8	segement	segment
243	8	segement	segment
247	11	rectanlge	rectangle
247	-20	trinionometric	trigonometric
247	-17	Suppoe	Suppose
251	12	certian	certain
251	-6	sqaring	squaring
252	-10	inequailty	inequality
252	-4	analycially	analytically
254	-11	completely	completely
255	7	mathematicain	mathematician
256	2	defiend	defined
258	6	trianlges	triangles
258	7	congrument	congruent
259	18	respectivley	respectively
259	-3	Pythagorus	Pythagoras
249	-10	$\frac{\theta^2}{3!}$	$\frac{\theta^3}{3!}$
260	-5	wehre	where
262	7	whcih	which
263	13	differentitating	differentiating
264	1	$\frac{f(x)}{g(x)}$	$\frac{g(x)}{h(x)}$
264	7	$c(x) < \delta$	$c(x) < c + \delta$
273	-7	supose	suppose
273	-4	segtment	segment
274	-3	gemoetry	geometry
276	-7	generaltiy	generality
277	-10	applicaions	applications
277	-9	inteval	interval
278	4	funciton	function

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Page No.	Line No.	incorrect	correct
280	14	behaiavour	behaviour
280	-8	ocurse	course
280	-3	inequaltiy	inequality
280	-1	funciton	function
281	4	funciton	function
281	7	upwrds	upwards
281	-4	convavity	concavity
282	-3	thorough	through
283	10	numebrs	numbers
284	11	infelction	inflection
284	-11	insiginificant	insignificant
285	-12	proceudre	procedure
286	5	anyting	anything
286	21	Thoerem	Theorem
286	24	Theroem	Theorem
286	-8	occurring	occurring
287	-15	basd	based
287	-2	rectnagles	rectangles
288	16	doamin	domain
288	-19	cleary	clearly
288	-15	polints	points
289	-7	theroem	theorem
289	-6	exitence	existence
290	2	soley	solely
290	2	derivtive	derivative
290	7	condenmning	condemning
290	19	Shakespear	Shakespeare
290	-18	mroe	more
290	-2	funciton	function
290	-1	infinintely	infinitely
292	-4	calclation	calculation
293	18, 18	(a, b)	$[a, b]$

(continued ...)

Page No.	Line No.	incorrect	correct
294	1	ingeneous	ingenius
294	14	skecthing	sketching
295	6	derivativg	derivative
295	15	whcih	which
296	2	Figrue	Figure
297	13	traingle	triangle
298	13	moe	more
300	-7	explicilty	explicitly
301	-1	continous	continuous
302	-8	piont	point
303	10	ingeneous	ingenius
305	-1	ot	of
309	-13	direciton	direction
310	10	cyloid	cycloid
311	-4	fraction	function
312	-1	calculaitons	calculations
313	1	mehtod	method
313	8	funciton	function
315	10	gies	gives
315	-16	mehtod	method
315	-2	diferentiable	differentiable
316	-13	funciton	function
316	-11	in (5)	in (6)
317	9	funciton	function
317	12	funciton	function
317	-18	theroem	theorem
317	-16	Thereom	Theorem
317	-5	theroem	theorem
318	7	Inermediate	Intermediate
318	9	Exericse	Exercise
318	11	theroem	theorem

(continued ...)

Page No.	Line No.	incorrect	correct
318	-19	funciton	function
318	-14	inteval	interval
319	4	cosntant	constant
319	5	mehtod	method
320	21	funciton	function
320	-17	inerior	interior
321	7	funciton	function
321	-10	polint	point
324	-15	what on an	what an
326	7	x_i	x_1
327	14	trapezeum	trapezium
330	5	$L(Q; f)$	$U(Q; f)$
331	2	Reimann	Riemann
331	8	x_i	x_1
331	8	y_i	y_1
335	-9	trapezeum	trapezium
336	9	themselevs	themselves
337	-10	abvoe	above
338	-15	by (2)	by (3)
338	-12	applying (2)	applying (3)
338	-3	someting	something
339	9	refinment	refinement
339	17	subintevals	subintervals
339	19	partion	partition
339	-19	comparision	comparison
340	3	suprisingly	surprisingly
340	13	evey	every
341	-4	Partitons	Partitions
342	-15	uper Rieman	upper Riemann
344	-2	approxmately	approximately
348	5, 6, 7	differentiability	differentiability

(continued ...)

Page No.	Line No.	incorrect	correct
349	9	neglibly	negligibly
351	10	Morevoer	Moreover
351	15	differentiablity	differentiability
351	-8	juat	just
352	9	differentiablity	differentiability
353	-6	inequalies	inequalities
355	-16	Geometricolly	Geometrically
362	22	differentiablity	differentiability
368	18	anit-derivatives	anti-derivatives
368	-21	evalauted	evaluated
368	-3	canot	cannot
369	5, 8	rigourous	rigorous
370	14	resutl	result
374	2	Occasionally	Occasionally
375	5	continous	continuous
377	1	expresion	expression
380	10	variable	variable
381	3	conditons	conditions
381	14	continuosly	continuously
384	13	anology	analogy
387	1	Q.3.1	Section 3.1
388	8	the sum	the sum of the reciprocals
389	-10	proof here	proof
389	-9	complements	completeness
390	12	rational that	rational, then
390	13	defintion	definition
390	-2	postive	positive
396	12	defintion	definition
396	15	arbitrary	arbitrary
400	14	labourious	laborious
404	-4	combinatories	combinatorics

(continued ...)

Page No.	Line No.	incorrect	correct
407	-8	approahes	approaches
412	10	Occassionally	Occasionally
413	-5	approxiamtion	approximation
416	-15	accurary	accuracy
416	-13	Corollay	Corollary
416	-12	(10.1)	(9.1)
416	-12	(10.2)	(9.2)
416	-2, -1	trapezeum	trapezium
417	10	contants	constants
417	12	staright	straight
418	6	approxiamtion	approximation
418	-11	calcuation	calculation
419	12	calcuations	calculations
421	-16	$(x - x_{i-1})$	$(x - x_{i-1})$
422	-14	analgoues	analogues
423	4	vnishes	vanishes
423	15	analgoue	analogue
424	-15	numebrs	numbers
424	-10	dinstinct	distinct
425	4	Hene	Hence
425	-7	inetgrals	integrals
428	6	consequnce	consequence
428	6	convergene	convergence
430	-3	rigourously	rigorously
430	-2	non-rigourous	non-rigorous
431	5	x - axes	x - axis
433	1	crietrion	criterion
437	7	subsitution	substitution
439	-10	convered	converted
440	-17	unifrom	uniform
440	-11	therory	theory

(continued ...)

Page No.	Line No.	incorrect	correct
440	-1	sequene	sequence
444	2	trignometric	trigonometric
445	8	favourite	favorite
445	-5	non-emptpy	non-empty
446	6	satisfacotry	satisfactory
450	-12	unambigously	unambiguously
456	13	invervals	intervals
459	21	Aras	Areas
460	-13	rigourous	rigorous
464	-8	partitionss	partitions
466	12	fulfils	fulfills
484	footnote	Instaed	Instead
495	5	frustrum	frustum
500	-4	interared	iterated
502	2	simplyfing	simplifying
505	7	communitativity	commutativity
506	6	downdards	downward
514	3	genrerate	generate
517	-6	eigth	eighth
518	12, -9	trapezeum	trapezium
519	-15	trapezeum	trapezium
520	-5	$(-\infty, c]$	$(-\infty, c]$
520	-4	probobility	probability
525	-3	hypotense	hypotenuse
528	Figure	teapezeum	trapezium
529	-8	trapezeum	trapezium
530	6	tnat	that
536	9	postion	position
536	-11	Somootness	Smoothness
538	-20	smoothless	smoothness
547	-5	feined	defined

(continued ...)

Page No.	Line No.	incorrect	correct
558	- 16	resperctively	respectively
558	-9	asuming	assuming
561	-6	from	form
563	-1	centreed	centred
573	- 15	parametrizszation	parametrisation
577	6	concaity	concavity
578	1	stright	straight
578	-14	respectivley	respectively
579	1	parallelopiped	parallelepiped
581	23	co-ordiantes	co-ordinates
583	13	co-ordiantes	co-ordinates
586	-9	eccentrity	eccentricity
588	16	co-ordiantes	co-ordinates
589	1	simplifaction	simplification
595	8	co-ordiantes	co-ordinates
598	16	co-ordinatess	co-ordinates
601	14	annulas	annulus
601	-6	co-ordiantes	co-ordinates
604	-2	co-ordiantes	co-ordinates
605	-5	co-ordiantes	co-ordinates
611	14	cicious	vicious
611	19	preson	person
611	-11	ingeneous	ingenious
611	-7	system	system
612	14	sahll	shall
612	20	converges to 0	converges to 1
612	-5	suach	such
613	14	traingle	triangle
615	-15	operarions	operations
615	-3	srory	story
617	6	lirerally	literally

(continued ...)

Page No.	Line No.	incorrect	correct
619	-2	rationl	rational
621	-7	emphasized	emphasised
621	-21	$\frac{1}{n} \rightarrow \infty$	$\frac{1}{n} \rightarrow 0$
621	-13	$\frac{1}{n} \rightarrow \infty$	$\frac{1}{n} \rightarrow 0$
622	12	arithmatic	arithmetic
623	20	reason then	reason than
624	4	theroty	theory
624	-9	syatem	system
625	-5	bouque	bouquet
627	-22	equivalence	equivalence
627	-12	exrension	extension
627	-5	equivalance	equivalence
627	-4	evenual	eventual
628	15	respevtively	respectively
630	-14	difficuly	difficulty
631	3	representive	representative
632	18	statemnet	statement
632	-13	arbitray	arbitrary
632	-4, -3	reprocal	reciprocal
633	4	presise	precise
633	13	nymber	number
633	16	independednt	independent
634	2	whenver	whenever
634	-3	emphasized	emphasised
635	7	presice	precise
635	-10	permanantly	permanently
638	-16	BC, CA and AB	$B'C', C'A'$ and $A'B'$
638	-14	$B'C', C'A'$ and $A'B'$	BC, CA and AB
641	-15	verical	vertical
643	14	$\{g_1, g_2, \dots, g_n\}$	$\{g_1, g_2, \dots, g_n, \dots\}$
644	11	fot	for

(continued ...)

Page No.	Line No.	incorrect	correct
656	-14	$(a_n + 1\sqrt{2})a_n^2$	$(a_n + \sqrt{2})q_n^2$
659	2	minuts	minutes
661	-4	whene	when
665	5	infinte	infinite
666	-10, -10, -9, -9	$\frac{2}{e}$	$2e$
674	2	and (iv)	and (v)
678	-6	funciton	function
678	-5	striclty	strictly
680	-6	functiion	function
682	9	defintions	definitions
682	-4	non-differentability	non-differentiability
688	4	end-ponts	end-points
690	6	Exericse	Exercise
690	-2	differentialility	differentiability
691	-6	$\frac{1}{2^n}$	$\frac{1}{2n}$
695	-2	ordre	order
696	-12	pont	point
698	-8	claculator	calculator
704	9	piont	point
704	-8	covnex combiantion	convex combination
705	-11	interevals	intervals
705	-10	downdards	downwards
708	-15	au	$u\sqrt{a^2 + b^2}$
708	-2	funciton	function
709	4	minized	minimised
709	-3	occuring	occurring
714	-3	prametrise	parametrise
716	-14	piont	point
718	3	contradicitng	contradicting
721	7	co-rodinates	co-ordinates
721	9, -16	trapezeum	trapezium

(continued ...)

Page No.	Line No.	incorrect	correct
726	11	discontiuity	discontinuity
737	-7	Exercie	Exercise
742	4	loarithm	logarithm
744	-4	calcuations	calculations
744	-2	indentity	identity
748	-6	analgoue	analogue
749	16	analgoue	analogue
751	3	differentiablity	differentiability
754	-7	betwen	between
755	1	exercie	exercise
756	1	prametrised	parametrised
756	13	traingle	triangle
756	-12	continously	continuously
762	5	interated	iterated
762	-11	traingles	triangles
763	2	calculaiton	calculation
764	16	contianing	containing
773	-7	mutaully	mutually
776	20	prependicular	perpendicular
776	-1	acomodates	accommodates
777	1	pulation	population
778	-9	Itegrating	Integrating
780	-13	subsitution	substitution
780	-4	parallelopiped	parallelepiped
780	-1	componenetwise	componentwise
783	-4	occurring	occurring
790	-24 (column 1)	varaible	variable
792	18 (column 1)	frustrum	frustum
794	-14 (column 2)	opeartor	operator
796	13 (column 2)	Shakespear	Shakespeare