Contents

L.	Basic topological ideas	
	1.1 The concept of a function 1.2 Continuity	1 4 9
	1.3 Continuity from a more general viewpoint 1.4 Further topological concepts	18
	1.5 Homeomorphism of spaces and equivalence of maps	25
	1.6 Compactness	27
	1.7 Connectedness	33
	Remarks on the literature	35
2.	Calculus	
	2.1 Differentiation	36
	2.2 Linear spaces and linear maps	38
	2.3 Normed linear spaces	45
	2.4 Differentiation (continued)	53
	2.5 Properties and uses of the derivative	64
	2.6 Higher orders of differentiation	72 80
	2.7 Germs and jets2.8 Local structure of differentiable maps I:	00
	Non-singular behaviour	92
	2.9 Local structure of differentiable maps II:	,
	Singularities	100
	Remarks on the literature	115
3.	Differentiable manifolds and maps	
	3.1 The concept of a differentiable manifold	116
	3.2 Remarks, comments and more examples of	
	differentiable manifolds	131
	3.3 The structure of differentiable maps between manifolds	146
	3.4 Tangent bundles and tangent maps	162
	3.5 Vector fields and differential equations	179
	Remarks on the literature	189

4. Qualitative theory of dynamical systems

4.1 Flows and diffeomorphisms	191
4.2 Local behaviour near fixed points and periodic orbits	204
4.3 Some global behaviour	217
4.4 Generic properties of flows and diffeomorphisms	221
4.5 Global stability	227
4.6 Dynamical systems under constraint	245
4.7 Breakdown of stability: bifurcation theory	252
Remarks on the literature	267
APPENDIX: Terminology and notation for sets and functions	268
REFERENCES	273
Index	284