

CONTENTS

1. VECTOR GEOMETRY AND ALGEBRA	1
0. Introduction	1
1. The Space \mathbf{R}^n	2
2. Dot Product and Angles	17
3. Lines in \mathbf{R}^n	28
4. A First Look at Planes in \mathbf{R}^3	35
5. A Second Look at Planes. The Cross Product	40
6. Systems of Linear Equations	49
7. Linear Independence and Dimension	61
8. Determinants	67
<i>Review Exercises.....</i>	77
2. VECTOR FUNCTIONS	80
0. Introduction.....	80
1. Limits, Continuity, and Differentiation	80
2. Velocity, Acceleration, Arc Length	92
3. Curvature, Unit Tangent, and Normal	101
<i>Review Exercises.....</i>	111
3. REAL VALUED FUNCTIONS	113
0. Introduction.....	113
1. Open and Closed Sets	113
2. Limits and Continuity	121
3. Graphing	127
4. Quadric Surfaces.....	138
<i>Review Exercises.....</i>	146
4. DIFFERENTIATION OF SCALAR FUNCTIONS	147
0. Introduction.....	147
1. Partial Derivatives	148
2. Linear Functions.....	154
3. Differentiable Functions	160
4. Directional Derivatives	172
5. The Chain Rule.....	179
6. Implicit Functions	188
7. Higher Derivatives	194
8. Taylor Polynomials	203
9. Extreme Values	211
10. Lagrange Multipliers	220
<i>Review Exercises.....</i>	229

5. MULTIPLE INTEGRATION	231
0. Introduction	231
1. The Double Integral	231
2. Iterated Integrals over Rectangles	240
3. Integrals over General Regions	247
4. Polar Coordinates	256
5. Polar Double Integrals	265
6. Triple Integrals	271
7. Cylindrical Coordinates	279
8. Spherical Coordinates	287
9. Applications	297
10. Leibniz's Rule	308
11. Improper Integrals	314
<i>Review Exercises</i>	326
6. VECTOR DIFFERENTIATION	328
0. Introduction	328
1. Limits, Continuity, and a Preview of Differentiation	329
2. Representation of a Linear Transformation by a Matrix	334
3. Matrix Arithmetic	342
4. Matrix Inversion	351
5. Differentiable Functions	359
6. The Chain Rule	366
7. Implicit Functions	373
8. Transformation of Coordinates	383
9. Change of Variables in Multiple Integrals	392
<i>Review Exercises</i>	400
7. VECTOR INTEGRATION	403
0. Introduction	403
1. Line Integrals	403
2. Green's Theorem	413
3. Vector Differential Operators	427
4. Independence of Path	439
5. Surfaces and Surface Area	449
6. Surface Integrals	458
7. Theorem of Stokes	469
8. Theorem of Gauss	479
<i>Review Exercises</i>	491
8. INFINITE SERIES	493
0. Introduction	493
1. Infinite Sequences	494
2. Infinite Series	501
3. Series of Positive Terms	506
4. Alternating Series	512
5. Ratio Test	515
6. Taylor Polynomials	519
7. Power Series	525
8. Taylor Series	530
9. Calculus of Power Series	534
10. Binomial Series	540
<i>Review Exercises</i>	544

TABLE OF INTEGRALS	.....	A-1
REFERENCES	.....	A-3
ANSWERS TO ODD NUMBERED PROBLEMS	.....	A-5
INDEX OF SYMBOLS	.....	A-22
SUBJECT INDEX	.....	A-24