

Content	fe
COLICIE	10

Ac	knov	wledgements	vii
1	F	Functions Review	
	1.1	Function Basics	1
	1.2	Graphing Functions	9
	1.3	Composition	16
	1.4	Inverse Functions	19
	1.5	Summary	24
2) _	the letter to Tricon an atric Functions	2
2	I	ntroduction to Trigonometric Functions	29
	21	The Unit Circle	- 30

2.1	The Unit Circle	30
2.2	Radians	40
2.3	Graphs of Trigonometric Functions	45
2.4	Transformations of Trig Functions	55
2.5	Inverse Trig Functions	64
2.6	Summary	76

3

4

6

Trigonometric Identities

3.1	Introduction to Trig Identities
3.2	Sums and Differences of Angles
3.3	Double and Half Angles
3.4	Sum-to-product and Product-to-sum
3.5 *	Problem Solving with Identities
3.6	Summary

83

128

192

Applications to Geometry

	* *	•	/															
4.1	Right Triangle Trigonometry	•••	•••	 	 • •			 •	•	• •		•	 	•			• •	. 128
4.2	Law of Cosines			 	 	• •		 • •	•			•	 	•				. 136
4.3	Law of Sines		•••	 	 	•••		 	•			•	 	•				. 141
4.4	More Triangle Relationships		•••	 • •	 • •			 	•	••	• •	•	 	•				. 148
4.5	Summary	• • •		 	 	• •	• •	 	•	• •		•	 	•	• •			. 152

)	Parameterization and Trigonometric Coordinate Systems	158
5.1	Parameterization	. 158
5.2	Polar Coordinates	. 167
5.3	Coordinates in Three Dimensions	. 177
5.4	Summary	. 187

Basics of Complex Numbers

6.1	Complex Number Arithmetic	92
6.2	The Complex Plane	98
6.3	Real and Imaginary Parts	.02
6.4	Nonreal Roots of Polynomials	.08
6.5	Summary	14

Г Ì	rigonometry and Complex Numbers	219
7.1	Polar Form of Complex Numbers	. 219
7.2	Exponential Form of Complex Numbers	. 225
7.3	Roots of Unity	. 233
7.4	Problems Involving Roots of Unity	. 242
7.5	Summary	. 250

8

Geometry of Complex Numbers

G	eometry of Complex Numbers	1	256
8.1	Transformations of the Complex Plane	 . :	256
8.2	Parallel and Perpendicular Lines	 	265
8.3	Distance	 . :	272
8.4	Regular Polygons	 	278
8.5 *	Classic Theorems	 •	286
8.6	Summary	 • •	293

9

Vectors in Two Dimensions

V	ectors in Two Dimensions	298
9.1	What's a Vector?	298
9.2	The Dot Product	305
9.3	Lines and Linear Dependence	313
9.4	Projections	323
9.5	Summary	331

U	Matrices in Two Dimensions	335
10.1	What is a Matrix?	335
10.2	Multiplying Matrices	340
10.3	Matrices as Transformations	348
10.4	The Determinant	355
10.5	Geometric Interpretation of the Determinant	364
10.6	Inverting a Matrix	369
10.7	Summary	375

11	Vectors and Matrices in Three Dimensions, Part 1	380
11.1	Vectors in Three Dimensions	380
11.2	3 × 3 Matrices	384
11.3	Determinants of 3 × 3 Matrices	395
11.4	More Than Just 2×2 and 3×3	409
11.5	Summary	415

2	Vectors and Matrices in Three Dimensions, Part 2	421
12.1	Lines and Planes in Three Dimensions	. 421
12.2	More Planes in Three Dimensions	. 428
12.3	The Cross Product	. 442
12.4	Geometric Interpretation of the Determinant	. 450

CONTENTS

12.5	Inverse of a 3×3 Matrix	454
12.6	Summary	457

13	Vector Geometry	463
13.1	Introduction	 463
13.2	Vectors in the Triangle	 469
13.3 *	Vectors, Complex Numbers, and Challenging Problems	 476
13.4	Summary	 485

References

Hints to Selected Problems

Index

501

.

489

488