MATH 2415: Calculus 3

Fall 2024

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1 Vectors and the Geometry of Space

- 1.1 Vectors in the Plane
- 1.2 Vectors in Three Dimensions
- 1.3 Dot Products
- 1.4 Cross Products
- 1.5 Lines and Planes in Space
- 1.6 Cylinders and Quadric Surfaces

2 Vector-Valued Functions

- 2.1 Vector-Valued Functions
- 2.2 Calculus of Vector-Valued Functions
- 2.3 Motion in Space
- 2.4 Length of Curves
- 2.5 Curvature and Normal Vectors

3 Functions of Several Variables

- 3.1 Graphs and Level Curves
- 3.2 Limits and Continuity
- 3.3 Partial Derivatives
- 3.4 The Chain Rule
- 3.5 Directional Derivatives and the Gradient
- 3.6 Tangent Planes and Linear Approximation
- 3.7 Maximum/Minimum Problems
- 3.8 Lagrange Multipliers

4 Multiple Integration

- 4.1 Double Integrals over Rectangular Regions
- 4.2 Double Integrals over General Regions
- 4.3 Double Integrals in Polar Coordinates
- 4.4 Triple Integrals
- 4.5 Triple Integrals in Cylindrical and Spherical Coordinates
- 4.6 Integrals for Mass Calculations
- 4.7 Change of Variables in Multiple Integrals

5 Vector Calculus

- 5.1 Vector Fields
- 5.2 Line Integrals
- **5.3** Conservative Vector Fields
- 5.4 Green's Theorem
- 5.5 Divergence and Curl
- **5.6** Surface Integrals
- 5.7 Stokes' Theorem
- 5.8 Divergence Theorem