

MA 345 Calculus III: Multivariable

University of Saint Mary — Fall 2024

Each item below refers to a section of the course textbook *Calculus: Early Transcendentals* (Third Edition) by William Briggs, Lyle Cochran, Bernard Gillett, and Eric Schulz.

Exam 1: Geometry in Higher Dimensions

- §13.1: Vectors in the Plane
- §13.2: Vectors in Three Dimensions
- §13.3: Dot Products
- §13.4: Cross Products
- §13.5: Lines and Planes in Space
- §13.6: Cylinders and Quadric Surfaces

Exam 2: Calculus of Vector-Valued Functions

- §14.1: Vector-Valued Functions
- §14.2: Calculus of Vector-Valued Functions
- §14.3: Motion in Space
- §14.4: Length of Curves
- §14.5: Curvature and Normal Vectors

Exam 3: Partial Differentiation and Optimization

- §15.1: Graphs and Level Curves
- §15.2: Limits and Continuity
- §15.3: Partial Derivatives
- §15.4: the Chain Rule
- §15.5: Directional Derivatives and the Gradient
- §15.6: Tangent Planes and Linear Approximation
- §15.7: Maximum / Minimum Problems
- §15.8: Lagrange Multipliers

Exam 4: Multiple Integration

- §16.1: Double Integrals over Rectangular Regions
- §16.2: Double Integrals over General Regions
- §16.3: Double Integrals in Polar Coordinates
- §16.4: Triple Integrals
- §16.5: Triple Integrals in Cylindrical and Spherical Coordinates
- §16.6: Integrals for Mass Calculations
- §16.7: Change of Variables in Multiple Integrals

Exam 5: Calculus of Vector Fields

- §17.1: Vector Fields
- §17.2: Line Integrals
- §17.3: Conservative Vector Fields
- §17.4: Green's Theorem
- §17.5: Divergence and Curl
- §17.6: Surface Integrals
- §17.7: Stokes's Theorem
- §17.8: Divergence Theorem