

Math 21D Midterm 2 Study List

15.7 Triple Integrals in Cylindrical and Spherical Coordinates

- Setting up and computing triple integrals using spherical coordinates

15.8 Substitutions in Multiple Integrals

- Definition: Jacobian in 2D/3D
- Computing Jacobians and magnification
- Finding image of points, curves, and/or regions in 2D using map $F(u,v)$
- Computing area using Jacobian
- Finding $G(x,y)$ the inverse map of $F(u,v)$

13.1 Curves in Space and Their Tangents

- Graphing curves in 2D/3D
- Definition: Position vector function
- Definition: Velocity vector function
- Definition: Acceleration vector function
- Definition: Speed
- Building position vector function
- Computing velocity and acceleration vector functions, along with speed
- Differentiation Rules for Vector Functions Pg 730
- Proof: Dot Product Rule Pg 730
- Proof: Chain Rule Pg 730

13.2 Projectile Motion

- Projectile Motion starting at origin or at height b

13.3 Arc Length in Space

- Definition: Arc Length
- Definition: Unit Tangent Vector
- Computing arc length from $t=a$ to $t=b$
- Computing arc length $s(t)$, as a function of t
- Computing unit tangent vector

13.4 Curvature and Normal Vectors of a Curves

- Definition: Unit Normal Vector
- Definition: Curvature
- Computing unit normal vector
- Computing curvature
- Computing radius of curvature
- Proof: Circle of radius a has curvature of $1/a$

16.1 Line Integrals

- Computing mass, 1st moments, center of mass, centroid, or moment of inertia for line integrals
- Computing line integrals

16.2 Vector Fields and Line Integrals: Work, Circulation, and Flux

- Definition: Vector fields in 2D/3D
- Definition: Gradient fields in 2D/3D
- Definition: Work
- Definition: Flow
- Definition: Flux
- Computing work
- Computing flow
- Computing flux

16.3 Path Independence, Conservative Fields, and Potential Functions

- Definition: Path Independence
- Definition: Conservative Field
- Definition: Potential Function
- Theorem: Fundamental Theorem of Line Integrals
- Proof: Fundamental Theorem of Line Integrals
- Computing potential function from conservative field (i.e. find scalar function from gradient field)
- Determine whether vector field is conservative
- Using Fundamental Theorem of Line Integrals to compute a line integral

Notes:

- Any definition listed can be asked on the test.
- Any formula used in any computation above can be asked on the test.