

Topics for Exam 2**I. Differentiability**

1. Sufficient conditions for differentiability
 - i. Differentiability of Paths; tangent line approximation.
 - ii. Differentiability of scalar fields.
 - iii. C^1 maps and differentiability.
 - iv. The Jacobian matrix
2. Differentiability of Compositions: The Chain Rule

II. Integration

1. Path Integrals
 - i. Arc Length
 - ii. Definition of the Path Integral
2. Line Integrals
 - i. Gradient Fields
 - ii. Flux Across Plane Curves
3. Differential Forms
 - i. Differential 1-forms
 - ii. Calculus of Differential Forms
 - iii. Evaluating 2-forms: Double Integrals
4. Fundamental Theorem of Calculus in \mathbb{R}^2
 - i. The differential of a form
 - ii. Green's Theorem
5. The Change of Variables Theorem