

Topics for Exam 1**1. Euclidean Space**

- 1.1 Definition of n -Dimensional Euclidean Space
- 1.2 Spans, Lines and Planes
- 1.3 Dot Product and Euclidean Norm
- 1.4 Orthogonality and Projections
- 1.5 The Cross Product in \mathbf{R}^3

2. Functions

- 2.1 Vector fields, scalar fields and paths
- 2.2 Definition of continuous function
- 2.3 Compositions of Continuous Functions
- 2.4 Limits and continuity

3. Differentiability

- 3.1 Definition of differentiability
- 3.2 The derivative as a linear approximation
- 3.3 Derivatives of vector valued functions
- 3.4 Derivatives of scalar fields
 - i. The gradient
 - ii. Partial derivatives
 - iii. Directional derivatives
- 3.5 Sufficient conditions for differentiability; C^1 functions

Relevant chapters and sections in the text: Chapter 2, Section 3.1, Sections 7.1, 7.3, and 7.4

Relevant chapters in the online class notes: Chapter 2, Chapter 3, and Chapter 4 (up to section 4.5.3)

Important Concepts: Euclidean space, orthogonal projections, continuous function, differentiable function, gradient, directional derivative, C^1 maps.

Important Skills: Know how to compute projections, find equations of lines and planes, show that a function is continuous, and show that a function is differentiable.