

# Exam 1 Outline

## Geometry of $\mathbb{R}^2$ and $\mathbb{R}^3$ : Vectors, Lines, Planes, and Matrices

- I. Vectors in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ 
  - A. Basics of Vectors and Applications
  - B. Various Notations for Vectors
  - C. Dot and Cross Products and their Geometric Interpretations
- II. Lines and Planes in  $\mathbb{R}^3$ 
  - A. Parametric Equations of Lines
  - B. Equations of Planes
  - C. Distance from a Point to a Given Line or Plane
  - D. Intersections of Lines and Planes
- III. Linear Transformations of Vectors
  - A. Solve Systems of Linear Equations with Augmented Matrices
  - B. Matrices as Linear Transformations
  - C. Matrix Operations
  - D. Inverse Matrices and Determinants
  - E. Eigenvalues and Eigenvectors