Course Outline for Math 107: Vectors and Matrices

Semester I:August 18, 2024 - December 26,2024

Text Books:

1. Elementary Linear Algebra, Applications Version, **11th Edition** by Howard Anton and Chris Rorres, John Wiley and Sons (Only Chapters 1 and 2) (**You may download** the book from the following link: <https://fac.ksu.edu.sa/tmga1/course/130491>
2. Calculus, Sixth Edition by E. R. Swokowski, M. Olinick and D. Pence, PWS Publishing Company. Boston, 1994

Detailed Syllabus

Linear Algebra

Chapter 1: Systems of Linear Equations and Matrices

1.1 Introduction to systems of linear equations
1.2 Gaussian elimination
1.3 Matrices and matrix operations
1.4 Inverse; Rules of matrix arithmetic
1.5 Elementary matrices and a method for finding A^{-1}
1.6 Further results on systems of equations
1.7 Diagonal, triangular and symmetric matrices

Chapter 2: Determinants

2.1 The determinant function

2. 2 Evaluating determinants by row reduction

2.3 Properties of the determinant function

2.4 Cofactor expansion; Cramer's Rule

Calculus

Chapter 10: Vectors, and Surfaces

10.1 Vectors in two-dimensions

10.2 Vectors in three-dimensions

10.3 The dot

10.4 The vector product

10.5 Lines and planes

10.6 Surfaces

Chapter 11: Vector-Valued Functions

11.1 Vector-valued functions and space curves

11.2 Limits, derivatives, and integrals

11.3 Curvilinear motion

11.4 Curvature

11.5 Tangential and normal components of acceleration

Chapter 12: Partial Differentiation

12.1 Functions of several variables

12.2 Limits and continuity

12.3 Partial derivatives

12.4 Increments and differentials

12.5 Chain rules

12.6 Directional derivatives and gradient vector

12.7 Tangent planes and normal lines

12.8 Extrema of functions of several variables

12.9 Lagrange multipliers