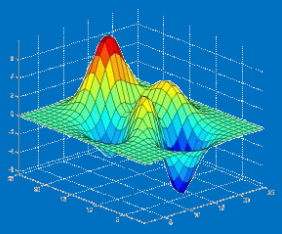

Midterm Exam Outline

Math 104C: Numerical Analysis
Professor: Paul J. Atzberger

Approximation Theory

- Least Squares Approximation
    - linear least-squares
    - normal equations
    - fitting polynomials, exponentials, linearly independent functions to data
- Orthogonal Polynomials
    - normal equations
    - Gram-Schmidt orthogonalization
    - Legendre polynomials
        - recursive relations
        - approximation properties
    - Chebyshev polynomials
        - recursive relations
        - connections to trigonometric polynomials
        - approximation properties
- Power Series, Rational Function Approximation
    - Pade' approximation
    - Continued-Fraction approximation
    - Chebyshev rational approximation
    - Trigonometric Polynomials
- Fourier Transforms
    - Fourier transforms and its inverse
    - interpolation interpretation
    - Fast Fourier Transform (FFT) algorithm

Approximating Eigenvalues

- Linear algebra
    - eigenvalues
    - similarity transforms
    - Gershgorin circle theorem
- Orthogonal matrices
    - similarity transforms
    - diagonalization
    - symmetric matrices
    - eigenvalues
- Power Method
    - finding eigenvalues and eigenvectors
    - deflation method
- Tridiagonal systems and Householder's Method
- QR Factorization, QR Algorithm
- Singular Value Decomposition (SVD)