

## MA 162 Course Outline

- I. Linear Systems
  - A. Solve linear systems of two or more variables by graphing, substitution, elimination or Gauss-Jordan methods.
  - B. Recognize consistent, inconsistent, and dependent systems
  - C. Write solutions in parametric form
  - D. Set up and solve applied problems
- II. Matrix Operations
  - A. Recognize and be able to write coefficient matrices and augmented matrices
  - B. Be able to define and identify square matrices, equal matrices, and matrices dimensions.
  - C. Add and subtract matrices
  - D. Perform scalar multiplication
  - E. Perform matrix multiplication
  - F. Find inverses
  - G. Use inverses to solve systems
- III. Linear Inequalities
  - A. Graph inequalities
  - B. Graph systems of inequalities
  - C. Identify corner points and feasible regions
  - D. Solve optimization problems by substituting corner points into objective functions.
  - E. Identify standard maximization and minimization problems.
  - F. Solve standard maximization simplex problems
  - G. Solve duality problems using simplex
  - H. Convert non-standard optimization problems to standard maximum problems:
    - i. Problems with  $\geq$  constraints
    - ii. Problems with  $=$  constraints
    - iii. Problems with negative numbers on the right-hand side of constraints
    - iv. Problems with a minimized objective function.
  - I. Identify simplex problems without a single solution
    - i. Multiple solutions
    - ii. Unbounded solutions
    - iii. No solutions
  - J. Solve applied optimization problems using simplex and/or graphing methods.
- IV. Sets
  - A. Use, define and identify setbuilder notation, empty or null set, universal set, equal sets, subsets, proper subsets, elements, union, intersection, complements, disjoint sets
  - B. Use and solve applied problems with Venn Diagrams.
  - C. Identify the number of elements in sets
- V. Combinatorics
  - A. Define and use the Multiplication Rule on applied counting problems.
  - B. Define and use the Addition Rule on applied counting problems.
  - C. Solve applied permutation problems.

- D. Solve applied combination problems
- VI. Probability
  - A. Identify and define experiment, outcome, trial, sample space, event, empirical probability, random outcomes
  - B. Find probabilities of equally likely events in applied problems
  - C. Find probabilities of compound events in applied problems
    - i. union
    - ii. intersection
    - iii. complement
  - D. Define and identify mutually exclusive events and independent events.
  - E. Solve applied conditional probability problems.
  - F. Solve applied probability problems using Baye's Rule

OPTIONAL

- VII. Markov Chains
  - A. Identify and define state matrices, transition matrices, markov chains, and steady-state matrices
  - B. Solve applied problems involving Markov Chains
  - C. Find steady-state matrices
  - D. Identify regular matrices
- VIII. Solve applied problems using Bernouilli's Formula