MATH M118 Departmental Final Examination Testing Objectives

Table B from textbook will be provided on the departmental final examination.
Final examination will have 20 questions, 5 points each.
Final examination will NOT be multiple choice.
Partial credit will be awarded.

Chapter 1: Introduction to Logic

Given a statement with any combination of connectors, determine the truth values using a truth table.
- Negation
- Conjunction
- Disjunction
- Conditional
- Biconditional

Given a statement, determine if it is a tautology, contradiction, or neither.

Given a statement, write the inverse, converse, and contrapositive of the original statement.

Given an argument, translate into symbolic form and determine its validity by constructing a truth table (i.e., is the argument a tautology).

Chapter 2: Set Theory

Given sets, perform set operations to form a new set and determine the new set's cardinality.
- Union
- Intersection
- Complement
- Cartesian Product

Given a set, form a partition of the set and draw a Venn diagram of the set.

Given a set, determine the number of different subsets that can be formed.

Given a word problem, use sets, Venn Diagrams, and De Morgan's Laws to find the solution.

Chapter 3: Combinatorics

Given an experiment, draw a tree diagram to represent the outcomes of an experiment.

Given an experiment, determine the number of outcomes using an appropriate counting formula.
- Fundamental Counting Principle (Factorials)
- Permutation
- Ordered Partition with Indistinguishable Objects (Letter Problems)
- Circular Permutation
- Combination
- Unordered Partition

Chapter 4: Probability

Given an experiment, construct:
- an event (collection of equally-likely outcomes) and
- determine the probability of the event using
- the properties of probability and
- the addition rule of probability.

Given an experiment, determine the:
- odds for and against an event, and
- if two events are disjoint.

Given an experiment, determine:
- conditional probability of an event,
- if two events are independent,
- probability of an event using Bayes' Formula, and
- binomial probability (a sequence of Bernouli trials) of an event.

Chapter 5: Statistics

Given a set of data, compute central tendency.
Mode Median Mean

Given an experiment, find the:
- Values of the Random Variable
- Probability Density Function
- Expected Value (Mean)
- Standard Deviation

Given a Binomial Random Variable, find the mean and standard deviation.

Given the mean and standard deviation, convert a score to a Z-score.

Given a normal random variable, the mean and standard deviation, use Table B to find the probability a randomly selected score is:
- below a certain value,
- between two values, and
- above a certain value.

Given a binomial random variable, approximate probabilities using an approximation to the normal distribution.

Chapter 6: Linear Equations and Matrix Algebra (Skip 6.4: The Leontief Input-Output Model)

Given a system of linear equations, use the Gauss-Jordan or All Integer Method to solve.

Given two matrices, perform matrix operations to form a new matrix, if possible.
- Addition
- Scalar Multiplication
- Multiplication
- Transpose of a Matrix

Given a matrix, find the inverse, if it exists.

Given a system of linear equations,
- put the system into matrix form AX = B, and
- use the inverse of matrix A to solve the system.

Chapter 9: Markov Chains (Skip 9.3: Absorbing Markov Chains)

Given an experiment that is a Markov process (chain), construct a:
transition diagram, transition matrix, and initial state vector.

Given a transition matrix and initial state vector of a Markov chain, find the state vector after n repetitions.

Given a transition matrix of a Markov chain, determine if the matrix is regular.

Given a regular transition matrix of a Markov chain, find the steady state vector.