

MAE 113 Discrete Techniques for Computing Key Objectives

These are to be able to do the following.

1. Given sets A and B , describe the sets $A \cup B$, $A \cap B$, and the set of all subsets of A . State the cardinality of the set of all subsets of A . Use the inclusion/exclusion principle for two or three sets.
2. Find a boolean formula expressing the output of a given logic circuit and vice versa. Write out the truth table of a boolean formula.
3. Add and multiply binary numbers. Convert from binary numbers to decimal and from decimal to binary. Multiply decimal numbers by Russian Peasant multiplication.
4. Determine whether or not a table is the lookup table of a function. Determine from its lookup table whether a function $f : X \rightarrow Y$ is 1-1 or onto. Given functions $f : X \rightarrow Y$ and $g : Y \rightarrow Z$, find their composite $g \circ f$ either from their algebraic formulas or from their lookup tables. Given a function $f : X \rightarrow Y$ which is 1-1 and onto, find the inverse function f^{-1} either from the algebraic formula or from the lookup table for f .
5. Add, subtract and multiply integers modulo a given positive integer.
6. Find a digraph from its adjacency matrix, and vice versa.
7. Do simple calculations with factorials $n!$. Calculate the number of ways of rearranging a string of letters.