Some problems to study for final exam Math 22, Winter 2015
(These are not necessarily all!)

(1) Solve a linear congruence and tell how many solutions in the original modulus
(2) Use modular arithmetic correctly
(3) Be able to tell whether a graph has a Hamiltonian cycle or an Euler circuit

(6) Be able to find the chromatic number of a graph.
(7) Be able to draw a graph with a given degree sequence.
(8) Be able to represent a graph with a matrix and know how to use powers of the adjacency matrix to find numbers of paths between vertices.
(9) Be able to decide whether two graphs are isomorphic.
(10) Find the shortest path from one vertex to another in a weighted graph.
(11) Understand the use of logical connectives, and be able to build the truth table for a logical statement
(12) Understand the difference between a statement, its converse, its inverse, and its contrapositive.
(13) Be able to give a simple proof by contradiction.
(14) Use Euler's formula, use its corollaries to decide whether a graph is non-planar.
(15) Use Prufer's code for a given labeled tree, or recreate the tree from the code.
(16) Use Kruskal's or Prim's algorithm to find a minimal spanning tree for a graph.
(17) Prove a statement by induction.
(18) Decide whether a mathematical relation is an equivalence relation.
(19) Set up a generating function to solve a counting problem
(20) Use the Principle of Inclusion/Exclusion
(21) Use the pigeonhole principle.
(22) Solve a recurrence relation using the characteristic equation.
(23) Find the chromatic number of a graph.

Universe = {1,2,3,…,10}
Let A={x congruent to 1, mod 4}, B = {a,b}.
Find the
(1) # of functions from A to B.
(2) # of functions from B to A.
(3) # of 1 to 1 functions from A to B.
(4) # of 1 to 1 functions from B to A.
(5) # of onto functions from A to B.
(6) # of onto functions from B to A.
(7) # of equivalence relations on A X A.
(8) # of subsets of A∪B with 3 elements.
(9) # of ordered arrangements of A∪B with 3 elements.
(10) # of functions f:A∪B -> {1,2,3,...,10} which have f(1)+f(5)+f(9)+f(a)+f(b) = 10.
(11) Expand $(3-4x^2)^5$
(12) Expand $(1-4x^2)^{-3}$ and show the first five terms.
(13) # of strings from A∪B of length 5 using exactly 3 symbols of A∪B.