Suggestions for preparing for the Fourth Exam

I. Functions and relations.

• Know the definitions!
  – Relation, inverse of a relation.
  – Function. Injective (one-to-one), surjective (onto) and bijective functions.

• Use a list of elements, an arrow diagram, a table, a graph, or a formula to define a function or relation.

• Determine whether a given relation is a function, or whether a given function is injective or surjective.

• Find the inverse relation of a function. Is it a function, injective, surjective?

• Give examples of functions satisfying various properties (see 7.2 #9 3rd Ed., 7.3 #5 2nd Ed.).

• Be able to compute the composition of two functions. See also problems §7.4 #16-19 3rd Ed., §7.5 #15-18 2nd Ed.

III. Relations on a set.

• Know the definitions!
  – Reflexive, symmetric, transitive.
  – Equivalence relation, equivalence class.
  – Partial order. Comparable, total order, maximal, minimal, least, greatest.

• Verify or prove that a given relation $R$ is symmetric.

• Ditto for reflexive, transitive, equivalence relation, partial order.

• Ditto for irreflexive, antisymmetric, asymmetric (but I will give you the definition).

• Use arrow diagrams, tables, graphs and lists of elements to represent a relation.

• For a relation $R$ on $A$, be able to find the smallest relation containing $R$ which is symmetric (ditto for reflexive, transitive, an equivalence relation, a partial order).

• Know the standard examples of equivalence relations (mod $n$, 10.3.10 and exercises 10.3 #18, 19, 22, 23 3rd Ed., 10.3 #15, 16, 19, 20 2nd Ed.).

• Know the standard examples of partially ordered sets: $\leq$ for the integers (or rationals) divides on the integers; $\mathcal{P}(A)$ for a set $A$; $D_n$; (10.5 #16, 17, 18, 19, 20, 21 both Eds.).

• Draw Hasse diagrams for a poset. Find minimal and maximal elements of a poset.