

Name (please print):

Math 213, Spring 2006
HW Assignment 11

Instructions

- **Write your name on the cover sheet and staple the sheet to the assignment.** Do the problems in order, and make sure that each problem is clearly labelled.
- **Deadline:** Friday, April 21.
- **Open House:** Wednesday, at the usual place and time (5 pm, 147 Altgeld).

About the problems

All the problems ask to check a given relation for various properties, or (in the case of the last two problems) check whether a given collection of subsets is a partition. Instead of following the instructions in the book literally, do the following:

- For problems about relations ignore questions about properties other than the “big three”: **reflexive, symmetric, and transitive**. Thus, you need not check for properties such as “antisymmetric”, “irreflexive”, etc. (Note that checking whether a relation is an equivalence relation is simply another way of asking whether a relation satisfies all of the “big three” properties.)
- For each given relation determine which of the “big three” properties it satisfies, and which ones it does not, and say so. (You can use abbreviations, e.g., R, S, T.)
- If a property holds, no proof is needed—just say so.
- **If a property (among the “big three”) does not hold, you must provide a proof.** The easiest way to do this is to produce a *concrete* example that violates the property. For example, consider relation on the integers defined letting $(a, b) \in R$ mean $|a - b| \leq 1$. This relation is reflexive and symmetric, but it is not transitive, since $(1, 2) \in R$, $(2, 3) \in R$, but $(1, 3) \notin R$ as $|1 - 3| > 1$.)
- For questions about partitions (the last two of the assigned problems) proceed analogously: That is, check which of the defining properties of a partition hold. (The sets in a partition must be (i) nonempty, (ii) pairwise disjoint, and (iii) their union must be all of S , the underlying “universe”.) If a given collection is not a partition, say which of these properties is violated, and provide a proof (e.g., by producing an element that belongs to two of the sets, or an element that is in none of the sets).

Problems

- Section 7.1, Problem 6(a)(c)(d)(f)(h) (i.e., all subproblems in the left column)
- Section 7.5, Problem 3 (all parts)
- Section 7.5, Problem 15
- Section 7.5, Problem 16
- Section 7.5, Problem 17
- Section 7.5, Problem 31 (all parts)
- Section 7.5, Problem 32 (all parts)