Homework 15

Math 302 (section 501), Fall 2016

This homework is due on TUESDAY, December 6.

0. *(This problem is not to be turned in.)*
   (a) Read Sections 9.1, 9.3–9.5
   (b) (Practice Problems) Section 9.1 # 3–4
   (c) (Practice Problems) Section 9.3 # 13
   (d) (Practice Problems) Section 9.5 # 3
1. Section 9.1 # 2, 6
2. Section 9.3 # 4, 10(a–b), 22
3. Section 9.5 # 2
4. (a) List all *reflexive* relations on $A = \{1, 2\}$.
   (b) List all *symmetric* relations on $A = \{1, 2\}$.
   (c) How many relations on $A = \{1, 2\}$ are there?
5. (a) Give a formula for the number of relations on $A = \{1, 2, \ldots, n\}$.
   (b) Give a formula for the number of *reflexive* relations on $A = \{1, 2, \ldots, n\}$.
   (c) Give a formula for the number of *symmetric* relations on $A = \{1, 2, \ldots, n\}$.
6. Consider the following relation R on the set of all functions from $\mathbb{R}$ to $\mathbb{R}$: we say that $f R g$ if $f(0) - g(0) \in \mathbb{Z}$. Is R an equivalence relation? Prove your answer.
7. Consider the following relation R on the set of all functions from $\mathbb{R}$ to $\mathbb{R}$: we say that $f R g$ if $f(0) \leq g(1)$. Is R reflexive? Symmetric? Antisymmetric? Transitive? Prove your answers.