MATH 1P67: Mathematics for Computer Science Spring 2016

Assignment 4: Relations

Due: Wednesday, July 6, at 19:00 (7:00 pm)

1. Consider the relations $R = \{(1,2),(2,3),(3,1)\}$ and $S = \{(2,1),(3,2),(1,3)\}$ on $\{1,2,3\}$.

a) Show that R is not an equivalence relation.
b) Show that S is not an equivalence relation.
c) Find $S \circ R$.
d) Show that $S \circ R$ is an equivalence relation.
e) What are the equivalence classes of $S \circ R$?

2. Prove that the relation $R = \{(x,y) \mid x - y \text{ is an integer}\}$ is an equivalence relation on the set of rational numbers. What is the equivalence class of 0? What is the equivalence class of $1/2$?

3. Use the connectivity relation to find the transitive closure of the following relation:

$$R = \{(a,a),(a,b),(a,c),(b,c),(c,a),(c,b)\}$$

Show each step of the algorithm in your work.