

Discrete Structures 2IT50

Interim test September 21, 2016, 13:45 - 14:45

This interim test is the first of three, of which the best two count for 30% of the final grade.

In giving proofs you may use theorems and lemmas from the lecture notes (not exercises), as long as you indicate that you use them.

The test consists of three problems each having the indicated weight.

Please indicate which of the following instruction groups you are assigned to:

- Group Erik de Vink, AUD 9
- Group Jerry den Hartog, AUD 10
- Group Jaap van der Woude, AUD 11
- Group Tom Verhoeff, AUD 14
- Group Wieger Wesselink, AUD 15

Problem 1.

(20 %) Give an example of a relation on $\{0, 1\}$ that is transitive but not antisymmetric.

Problem 2.

(20 %) The equivalence relation R on $\{1, 2, 3, 4, 5, 6\}$ is given by

$$R = \{(x, y) \mid (x - 3)^2 = (y - 3)^2\}.$$

Determine the equivalence classes of R , motivate your answer.

Problem 3.

Let R, S be relations on a set U satisfying $R; S \subseteq S$.

- (20 %) Prove that $(R^n); S \subseteq S$ for all $n \geq 0$.
- (20 %) Prove that $(S; R)^n \subseteq (S^n); R$ for all $n \geq 1$.
- (20 %) Prove that $(S; R)^+ \subseteq (S^+); R$.