

EE2302 Foundations of Information and Data Engineering

Assignment 3

Due: 11 pm, Sep 20

Full mark: 20 points

1. Let R be the relation on Z defined by

$$mRn \text{ if and only if } mn > 0 \text{ or } m = n = 0.$$

- a) (3 points) Prove that R is an equivalence relation.
 - b) (3 points) How many distinct equivalence classes are there? What are they?
2. (3 points) Let $a \equiv b \pmod{n}$ and $c \equiv d \pmod{n}$. Prove that $ac \equiv bd \pmod{n}$.
 3. (3 points) Let $A = \{a, b\}$. Describe all partial order relations on A .
 4. Consider the following two relations defined on \mathbf{R} , where \mathbf{R} is the set of real numbers:
 - For all $x, y \in \mathbf{R}$, $x S y$ if and only if $x \geq y$.
 - For all $x, y \in \mathbf{R}$, $x T y$ if and only if $x - y$ is an integer.
 - a) (2 marks) Which one is not an equivalence relation? Justify your answer.
 - b) (3 marks) Prove that the other one is an equivalence relation.
 - c) (3 marks) Describe its distinct equivalence classes.