Bucknell UNIVERSITY

Theory of Computation
CSCI 341, Fall 2016

Recitation 2
2016-08-30

Exercise 0.7 from Sipser page 26

Exercise 0.8 from Sipser

Exercise 3

let $R \subseteq A \times A$ be a binary relation as defined below. In which cases is R a partial order? a total order?

1. $A =$ the strictly positive integers; aRb iff b is divisible by a.
2. $A = \mathbb{N} \times \mathbb{N}$; $(a,b)R(c,d)$ iff $a \leq c$ or $b \leq d$.
3. $A = \mathbb{N}$; aRb iff $b = a$ or $b = a+1$.
4. A is the set of all English words; aRb iff a is strictly shorter than b.
5. A is the set of all English words; aRb iff a is the same as b or a occurs more frequently than b in Sipser's book.

Exercise 4

Let R_1 and R_2 be any two partial orders on the same set A. Show that $R_1 \cap R_2$ is a partial order.

Exercise 5

Let A be any set, let $\mathbb{B}$ be the set of booleans. We write $A \rightarrow \mathbb{B}$ for the set of all functions from A to $\mathbb{B}$. Prove that there exists a bijection between $A \rightarrow \mathbb{B}$ and the powerset of A, $\mathscr{P}(A)$.