

CSCSE 222 Homework 6 (Due Apr. 22)

1. What is the number of one-to-one functions f from the set $\{1, 2, \dots, n\}$ to the set $\{1, 2, \dots, n\}$ so that there is at most one x with $f(x) = x$?
2. Given a set S , let R be the relation defined on the power set $P(S)$ by ARB whenever $A \subseteq B$ and $A \neq B$ for $A, B \subseteq S$. Prove whether or not R is reflexive, symmetric, antisymmetric or transitive.
3. Given a finite set A with n elements, let R be the relation defined on the set of functions $f : A \rightarrow A$ by fRg whenever the size of range $\{f(x) \mid x \in A\}$ of f is the same as the size of range $\{g(x) \mid x \in A\}$ of g . Prove that R is an equivalence relation and determine the number of equivalence classes.
4. Construct a deterministic finite-state automaton for the language $L = \{w \in \{0, 1\}^* \mid w \text{ contains } 000 \text{ but does not contain } 111\}$.
5. Give an informal description of a deterministic Turing machine for the language $L = \{x \in \{0, 1\}^* \mid x \text{ is of the form } ww \text{ but not of the form } ww^R\}$.