CSE 311: Foundations of Computing I

Section: Relations, CFGs, and DFAs

CFGs

Construct CFGs for the following languages:

(a) All binary strings that end in 00.

(b) All binary strings that contain at least three 1's.

(c) All binary strings with an equal number of 1's and 0's.

Relations

(a) Draw the transitive-reflexive closure of $\{(1,2),(2,3),(3,4)\}$.

(b) Suppose that R is reflexive. Prove that $R \subseteq R^2$.

(c) Consider the relation $R = \{(x,y) \ : \ x = y+1\}$ on $\mathbb{N}$. Is R reflexive? Transitive? Symmetric? Anti-symmetric?

(d) Consider the relation $S = \{(x,y) \mid x^2 = y^2\}$ on $\mathbb{R}$. Prove that S is reflexive, transitive, and symmetric.

DFAs

Construct a DFA for the language of all binary strings, where $\Sigma = \{0,1,2\}$.