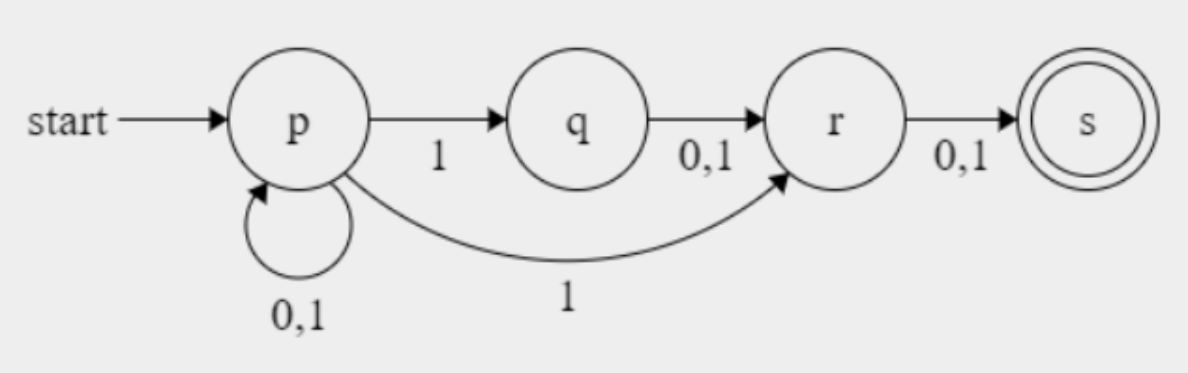
1.$Design\ a\ DFA\ for\ the\ language\ L=\{w\in\{0,1\}^*|w\ contains\ both\ 01\ and\ 10\ as\ ubstrings\}.$

2.$Design\ a\ NFA\ within\ four\ states\ for\ the\ language\ \{a\}^*\cup\{ab\}^*.$

3.$Design\ regular\ expressions\ for\ language\ over\ \Sigma=\{0,1\}.$
$(1).\ All\ strings\ contain\ the\ substring\ 001.$
$(2).\ All\ strings\ expect\ the\ string\ 001.$

4.$Prove\ that\ L=\{0^m1^n|\frac{m}{n}\ is\ an\ integer\}\ is\ not\ regular\ with\ pumping\ lemma.$

5.$Convert\ the\ following\ NFA\ into\ DFA\ with\ subset\ construction.$



6.$Give\ a\ context-free\ grammar\ for\ L=\{a^ib^jc^{i+j}|i,j\geq 0\}$

7.$Let\ L\ be\ the\ language\ generated\ by\ the\ grammar\ G\ below$
$S\rightarrow AB|BBB$
$A\rightarrow Bb|\varepsilon$
$B\rightarrow aB|A$
(1).消除空产生式
(2).消除单元产生式
(3).转换到CNF

8.$Design\ a\ PDA\ for\ L=\{w\in\{a,b\}^*|w\ has\ more\ a's\ than\ b's\}$

9.$Prove:\ for\ every\ context\ free\ language\ L,\ the\ language\ L'=\{0^{|w|}|w\in L\}\ is\ also\ context\ free.$

10.$Design\ a\ Turing\ Machine\ that\ computes\ the\ following\ function\ f:0^n\rightarrow binary(n)$
$Where\ integer\ n>=1\ and\ binary(n)\ is\ the\ binary\ representation\ of\ n.$
$For\ example:\ f(0^3)=11,f(0^5)=101.$

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