

Arden's law is used in simplification of regular expression. It states as, for p , q and r to be regular expressions, and if ϵ is not member of $L(P)$ then the equation in r as

$r = q + rp$ has a unique solution given by $r = qp^*$

Let us prove that $r = qp^*$ is unique solution of equation $r = q + rp$.

The equation is, $r = q + rp$ (i)

by substituting value of ' r ' equation (i) can be written as

$$r = q + (q + rp)p$$

$$r = q + qp + rp^2$$

$$r = q + qp + (q + rp)p^2$$

$$r = q + qp + qp^2 + rp^3$$

$$r = (q + qp + qp^2 + \dots + qp^i) + rp^{i+1}$$

$$r = q(\epsilon + p + p^2 + \dots + p^i) + rp^{i+1} \quad i \geq 0$$

$$r = qp^* \quad (\text{Here } p \text{ power } * \text{ means repetition of } p)$$

Related posts:

1. Definition of Deterministic Finite Automata
2. Notations for DFA
3. How do a DFA Process Strings?

4. DFA solved examples
5. Definition Non Deterministic Finite Automata
6. Moore machine
7. Mealy Machine
8. Regular Expression Examples
9. Regular expression
10. NFA with ϵ -Moves
11. NFA with ϵ to DFA Indirect Method
12. Define Mealy and Moore Machine
13. What is Trap state ?
14. Equivalent of DFA and NFA
15. Properties of transition functions
16. Mealy to Moore Machine
17. Moore to Mealy machine
18. Difference between Mealy and Moore machine
19. Pushdown Automata
20. Remove ϵ transitions from NFA
21. TOC 1
22. Difference between Mealy and Moore machine
23. RGPV TOC What do you understand by DFA how to represent it
24. What is Regular Expression
25. What is Regular Set in TOC
26. RGPV short note on automata
27. RGPV TOC properties of transition functions
28. RGPV TOC What is Trap state
29. DFA which accept 00 and 11 at the end of a string
30. CFL are not closed under intersection

31. NFA to DFA | RGPV TOC
32. Moore to Mealy | RGPV TOC PYQ
33. DFA accept even 0 and even 1 |RGPV TOC PYQ
34. Short note on automata | RGPV TOC PYQ
35. DFA ending with 00 start with 0 no epsilon | RGPV TOC PYQ
36. DFA ending with 101 | RGPV TOC PYQ
37. Construct DFA for a power n, $n \geq 0$ || RGPV TOC
38. Construct FA divisible by 3 | RGPV TOC PYQ
39. Construct DFA equivalent to NFA | RGPV TOC PYQ
40. RGPV Define Mealy and Moore Machine
41. RGPV TOC Short note on equivalent of DFA and NFA
42. RGPV notes Write short note on NFA
43. Minimization of DFA
44. Construct NFA without ϵ
45. CNF from $S \rightarrow aAD; A \rightarrow aB/bAB; B \rightarrow b, D \rightarrow d$.
46. NFA accepting two consecutive a's or two consecutive b's.
47. Regular expression to CFG
48. Regular expression to Regular grammar
49. Grammar is ambiguous. $S \rightarrow aSbS|bSaS|\epsilon$
50. leftmost and rightmost derivations
51. Construct Moore machine for Mealy machine
52. RGPV TOC PYQs
53. Introduction to Automata Theory