Algebraic laws of RE:

* **Shifting Rule: E(FE)\* = (EF)\*E** for e.g. 1\*(0 1\*)\* = (1\*0)\*1\* :[ E=1\*,F=0]
* **Denesting Rule: (E/F)\* = (E\*F)\*E\***

**= E\*(FE\*)\* [by shifting rule]**

**Again, (E/F)\* = (F/E)\* [by commutative law]**

**= (F\*E)\*F\* [by denesting rule]**

**= F\*(EF\*)\* [by shifting rule]**

* **(F\*E\*)\* = (F/E)\* = (E/F)\* = (E\*F\*)\*** for e.g. E = 0\*1, F = 1\*, then (0\*1/1\*)\* = ((0\*1)\*(1\*)\*)\* = ((0\*1)\*1\*)\* = (0\*1 / 1)\* = (0\*1/ ε.1)\* = ((0\* / ε)1)\* = (0\*1)\*
* Commutative law of OR operator: E/F = F/E
* Commutative law may not be true for Concatenation operator:

EF ≠ FE for e.g E = 1\*, F= 0\* then EF = 1\*0\* ≠ 0\*1\* = FE

* Associative law of OR operator: (E/F)/G = E/(F/G)
* Associative law of Concatenation operator: (EF)G = E(FG)
* ε.E = E. ε = E
* Distributive law: E(F/G) = EF/EG, (F/G)E = FE/GE
* Idempotent law: E/E = E
* (E\*)\* = E\* for e.g E = 0\* then (0\*)\* = 0\*, but (E\*F\*)\* ≠ E\*F\*
  + ((EF)\*)\* = (EF)\*

E\* = En, n>=0

= E0 / E1/ E2 /…..

Reasoning:

(E\*)\* = (En)m where m,n>=0

= Emn where mn >=0

= E0 / E1/ E2 /…..

= E\*

* ε\* = ε, ε+ = ε, ε2 = ε , ε3 = ε,…
* E+ = EE\* = E\*E

since E\* = ε/ E/EE/EEE/…. and

E+= E. ε /EE/EEE/…. = E(ε/ E/EE/EEE/….) = EE\*

* E\* = E+/ ε = ε / E+ [since E\* = ε/ (E/EE/EEE/….) = ε / E+]
* E+/ E = E+, E+/ EE = E+, …  [since E+= E/EE/EEE/….]
* E\* / ε = E\*, E\* / E = E\*, E\* / EE = E\*, … [since E\* = ε/E/EE/EEE/….]