

8)

→ A regular expression is a shorthand way of showing how a regular language is built from the base set of regular languages.

→ For each RE (E), there is a RL ($L(E)$)

Properties

1) Additive (+)

$$R+E = E+R$$

$$R+\emptyset = \emptyset + R = R$$

2) Product (\cdot)

$$R\emptyset = \emptyset R = \emptyset$$

$$R^A = A R = R$$

$$(RE)^F = R(EF)$$

3) Distributive

$$R(E+F) = RE + RF$$

$$(R+F)F = RF + EF$$

4) Closure

$$\emptyset^* = A^* = A$$

$$R^* = R^* R^* = (R^*)^* = R + R^*$$

$$RR^* = R^* R$$

$$R(ER)^* = (RE)^* R$$

5) Identify

$$\emptyset + \emptyset = \emptyset$$

$$\emptyset \cdot \emptyset = \emptyset \cdot \emptyset = \emptyset$$

$$e \cdot \emptyset = \emptyset \cdot e = \emptyset$$

$$\emptyset + \emptyset = \emptyset$$

$$\emptyset^* \cdot \emptyset^* = \emptyset^*$$

$$(\emptyset^*)^* = \emptyset^*$$

Ex: Regular Express to Finite Automata

$$\cdot (1^* 0 1^* 0 1^*)^* \quad \text{and} \quad (0 1^* 0 1^* 0 1^*)^*$$

