

Homework 02

1. Give a regular expression equivalent to the pattern: $(a(b?)a)^+$

$$(a(b?)a)^+ = (a(b|\epsilon)a)^+ = (aba|aa)^+ = (aba|aa)(aba|aa)^*$$

2. Give a pattern describing phone numbers (both stationary and mobile).

Assume, that the first digit cannot be 0, 1 nor 9. If it is 7 or 8, then the second digit cannot be a 0.

$$[2-6][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]$$

OR

$$[2-8][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]$$

3. Simplify the pattern: $(a^*(aba|abb)|b^*(bab|baa))^* (a(a^*ba|a^*bb)|b(b^*ab|b^*aa))$

$$(a^*(aba|abb)|b^*(bab|baa))^* (a(a^*ba|a^*bb)|b(b^*ab|b^*aa)) = (a^*aba|a^*abb|b^*bab|b^*baa)^* (aa^*ba|aa^*bb|bb^*ab|bb^*aa)$$

$$= (a^+ba|a^+bb|b^+ab|b^+aa)^* (a^+ba|a^+bb|b^+ab|b^+aa) = (a^+ba|a^+bb|b^+ab|b^+aa)^+ = (a^+b(a|b)|b^+a(a|b))^+$$

$$= ((a^+b|b^+a)(a|b))^+$$

OR

$$(a^*(aba|abb)|b^*(bab|baa))^* (a(a^*ba|a^*bb)|b(b^*ab|b^*aa)) = (a^*(ab(a|b))|b^*(ba(a|b)))^* (a(a^*b(a|b))|b(b^*a(a|b)))$$

$$= (a^*ab(a|b)|b^*ba(a|b))^* (aa^*b(a|b)|bb^*a(a|b)) = (a^+b(a|b)|b^+a(a|b))^* (a^+b(a|b)|b^+a(a|b)) = (a^+b(a|b)|b^+a(a|b))^+$$

$$= ((a^+b|b^+a)(a|b))^+$$