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CISC 630

Assignment 2

**Written Assignment 2.**

**1. (3.3.2) Describe the languages denoted by the following regular expressions:**

**a) a(a|b)\*a**

The language is a character sequence of 'a' and 'b' which always starts and ends with 'a'.

**b) ((epsilon|a)b\*)\***

The language is a character sequence of 'a' and 'b'.

**c) (a|b)\*a(a|b)(a|b)**

The language is a character sequence of 'a's and 'b's where the 3rd to last character is always an 'a'.

**d) a\*ba\*ba\*ba\***

The language is a character sequence of 'a's and 'b's containing any number of 'a's but exactly 3 'b' characters.

**e) (aa|bb)\*((ab|ba)(aa|bb)\*(ab|ba)(aa|bb)\*)\***

The language is a character sequence of 'a's and 'b's always containing an even number of 'a's and 'b's, but that may contain a different number of 'a's and 'b's.

**2. Write regular expressions for the following languages over the alphabet {a,b}:**

**a) The set of strings with at least three 'a's.**

(a|b)\*a(a|b)\*a(a|b)\*a(a|b)\*

**b) The set of strings with three consecutive 'a's.**

(a|b)\*aaa(a|b)\*

**c) The set of strings with an odd number of 'a's.**

(aa|b)\*a(aa|b)\*

**d) The set of strings that do not contain the substring 'bba'.**

(a|ba)\*b\*

**3 & 4. NFA/DFAs**

**a) (a|b)\*a(a|b)\*a(a|b)\*a(a|b)\***

**b) (a|b)\*aaa(a|b)\***

**c) (aa|b)\*a(aa|b)\***

**d) (a|ba)\*b\***

**Programming Assignment 2.**

**RSS.g4:**

**RSS.java:**

**CalculatorVisitor.java:**