

CSE625: Introduction to Formal Languages – Homework 2

Due: April, 17, 2009 (Fri) in class. No late homework is accepted.

**Note:** The TA might only grade a subset of the homeworks.

**Problem 1:** [18 pts] Textbook 3.9 (a) - (d), (g) - (i).

**Problem 2:** [18 pts] Find the regular expression for each of the following language.

(2.1)  $\{a^{3i+2} : i \geq 2\}$ , where the alphabet  $\Sigma = \{a, b\}$ .

(2.2)  $\{x \in \{0, 1, 2\}^* : x \text{ does not contain } 01 \text{ nor } 12 \text{ as a substring}\}$ .

(2.3)  $\{x \in \{0, 1, 2\}^* : x \text{ contains at least one } 0 \text{ and at least two } 2\text{'s}\}$ .

(2.4)  $\{x \in \{0, 1\}^* : |x| \text{ is divisible by } 4 \text{ or } 6\}$ .

(2.5)  $\{a^i b^{2i} : i \leq 3\}$ , where the alphabet  $\Sigma = \{a, b\}$ .

(2.6)  $\{a^i b^j : i + j \text{ is divisible by } 3, \text{ and } i, j \geq 0\}$ .

(Hint: Either  $i$  and  $j$  are both divisible by 3 or  $i - 1$  and  $j - 2$  are both divisible by 3, or  $i - 2$  and  $j - 1$  are both divisible by 3. )

**Problem 3:** [9 pts] Textbook 3.17 (a), (c), and (e).

**Problem 4:** [20 pts] Draw a FA for the language in Textbook 3.9 (a) - (d), (g) - (h).