Student ID:

CW Exam1

10th October 2019 COMP 2611

1. Draw NFAs for the following languages over $\Sigma = \{0, 1\}$:

   (a) $\{0^n 1^m 0^p \mid n, m \geq 0 \ \wedge \ p > 1\}$ [2]

   (b) $\{s \mid s \in \Sigma^*, \text{ contains an even number of 1s or an odd number of } 0s\}$ [2]

   (c) $\{0w0 \mid w \in \Sigma^*\}$ [2]

2. Derive regular expressions that would accept the following languages:

   (a) $\{(ab)^n \mid n \geq 0\}$ [2]

   (b) $\{a^n \mid n \text{ is even}\}$ [2]

   (c) $\{a^n \mid n \text{ is even}\} \cup \{a^b \mid n \text{ is odd}\}$ [2]

3. Suppose that you have two regular languages L_1 and L_2 that are recognized by NFAs N_1 and N_2 respectively. Explain, but not prove, how you can construct a machine N_3 that recognize $L_1 \cup L_2$ [3]

4. Consider the following strings over $\{0, 1\}$. Draw DFAs that recognize said languages. After drawing them, formally define their DFAs

   (a) $\{(01)^n \mid n \text{ is even}\}$ [2]

   (b) $\{1(0)^n \mid n \text{ is divisible by } 3\}$ [2]

5. Suppose that below NFA recognizes language L. Give the NFA that recognizes $\overline{L}$ [5]

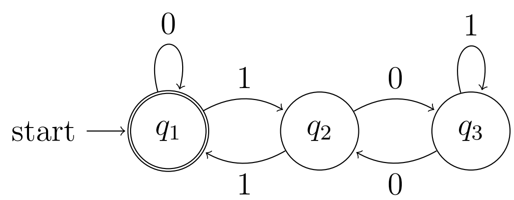

Figure 1: NFA1

6. Convert the following NFA to a regular expression

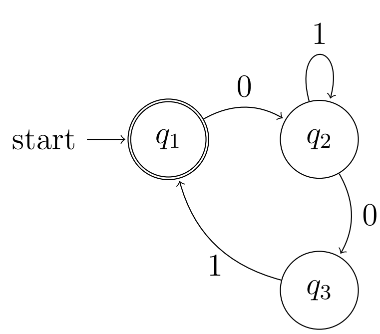

Figure 2: NFA1

[5]