

# Notre Dame University

## Computer Science Department

### CSC 311 Theory of Computation

#### Homework 1

For each of the following languages over  $\Sigma = \{0, 1\}$  build the DFA that recognizes it. Each exercise is worth 10 pts.

1.  $L = \{w \in \{0, 1\}^* : w \text{ begins with a 1 and ends with a 0}\}$ .
2.  $L = \{w \in \{0, 1\}^* : w \text{ contains at least two 1's}\}$ . Note: Not necessarily consecutive.
3.  $L = \{w \in \{0, 1\}^* : w \text{ contains the substring } 0110\}$ .
4.  $L = \{w \in \{0, 1\}^* : \text{every odd position of } w \text{ is a 1}\}$ .
5.  $L = \{w \in \{0, 1\}^* : \text{every 1 in } w \text{ is preceded and followed by a 0}\}$ .
6.  $L = \{w \in \{0, 1\}^* : w \text{ does not contain } 001 \text{ as substring}\}$ .
7.  $L = \{w \in \{0, 1\}^* : w \text{ contains at least two 1's not followed immediately by a 0}\}$ .
8.  $L = \{w \in \{0, 1\}^* : w \text{ ends in } 00\}$ .
9.  $L = \{w \in \{0, 1\}^* : w \text{ has three consecutive 0's}\}$ .
10.  $L = \{w \in \{0, 1\}^* : \text{the number of 1's in } w \text{ is divisible by 3}\}$ .