Theoretical Computer Science
CS 395 - HBD1
Department of Physics and Computer Science
Medgar Evers College
Exam 1 Makeup

Instructions:

- **The make-up exam requires completing a few tasks by Wednesday, 10/29, before class.**
- **Type your solutions in the Exam01 directory of your GitHub repository.**
- **The definition of DFAs must be formal to receive full credit when required.**
- **Cheating of any kind is prohibited and will not be tolerated.**
- **Violating and/or failing to follow any of the rules will result in an automatic zero (0) for the exam.**

TO ACKNOWLEDGE THAT YOU HAVE READ AND UNDERSTOOD THE INSTRUCTIONS ABOVE, PRINT YOUR NAME AND THE DATE ON YOUR SUBMISSIONS

Grading

Section	Maximum Points	Points Earned
1	2	
2	2	
3	2	
4	2	
Total	8	

1. **Prove**

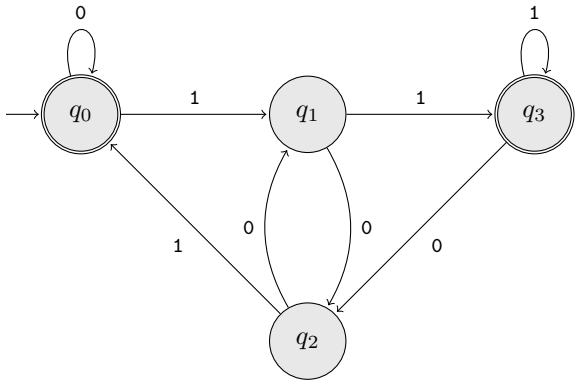
$$\sum_{i=1}^{n} 2i - 1 = \frac{n(2n-1)(2n+1)}{3}$$

2. **Construct a DFA that recognizes the language**

$$L = \{w : w \textbf{ is an even number of 1s followed by any number of 0s}\}$$

over $\Sigma = \{0, 1\}$**.**

3. **For each string listed, analyze the DFA below to determine whether the string is accepted. Clearly justify your answer by providing a proof or disproof.**



a. `0001` **b.** `10011` **c.** `1101` **d.** `11100`

4. **Construct a DFA that recognizes the union of the languages**

$$L_1 = \{w : 100 \notin w\}$$
$$L_2 = \{w : 2 \leq |w| \leq 4\}$$

over $\Sigma = \{0, 1\}$