



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

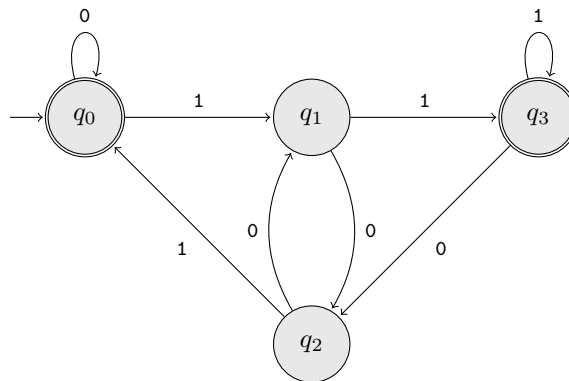
$$\sum_{i=1}^n (2i-1)^2 = \frac{n(2n-1)(2n+1)}{3}$$

2. Construct a DFA that recognizes the language

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

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