CS 361 – Homework 7

Total possible points: 75

1. (20 points) Create a **state-diagram** representation of a **Turing Machine M_1** that accepts the language A = {w over {0 , 1, #}* | w contains an equal number of 0's and 1's}. 10# ∈ A, 01#10 ∈ A, and #001 ∉ A.

2. Consider the **TM M_2** defined by the set of transitions shown below. Here we use B to indicate the tape's "blank symbol."
   a. (10 points) Give the **state diagram** of M_2 (assuming q_2 is a final state)
   b. (4 points) **Describe** the result of a computation in M_2 (i.e., explain in your own words what M_2 does given a string). Do *not trace the computation*, instead provide a high level overview of the language associated with M_2
   c. (3 points) **Trace** the computation of "BaabcaB"
   d. (3 points) **Trace** the computation of "BbcbB"

δ	B	a	b	c
q_0	q_1,B,R			
q_1	q_2,B,L	q_1,a,R	q_1,c,R	q_1,c,R
q_2		q_2,a,L		q_2,c,L

3. (20 points) Construct a **state-diagram** representation of a **Turing Machine M_3** with input alphabet {a, b} that accepts strings of the form ww^R (where w is a string over {a, b}). The **final configuration** should be q_f ww^R B.

4. (15 points) Give a **description**[1] of a **TM M_4** that decides language B = {w over {0, 1}* | w contains twice as many 1's as 0's}. For example: 101 ∈ B, 011 ∈ B, and 001 ∉ B

[1] Pseudocode of the behavior of the machine.