CS 4810 Homework Assignment 9 due Friday class Nov 8

Please place your net ID in upper right corner of your homework

1. Construct a Turing machine with alphabet $\{0, 1, b\}$ that executes copying. That is started in the ID $q_0 10^n$ it halts in the ID $q_f 10^n 10^n$.

2. Construct a Turing machine with alphabet $\{0, 1, b\}$ that executes multiplication. That is $q_0 10^n 10^m \mid \overset{*}{-} q_f 10^n 10^m 10^{nm}$.

3. Describe the construction of a context-free grammar G where $L(G) = \{ID_i \mid \overset{*}{-} ID_{i+1}^R | ID_i$ is an arbitrary ID$\}$ of a Turing machine.

4. How would you use the above G to construct G_1 and G_2 where $L(G_1) \cap L(G_2)$ is the set of modified valid computations of the Turing machine.
   A modified valid computation is a valid computation in which every even numbered ID is reversed.

5. If it is undecidable if an arbitrary Turing machine accepts the empty set, what does that say about $L(G_1) \cap L(G_2)$.