Homework #4
Please use this sheet for your answers
If you work with someone, you must write the solutions up yourself

#1. (10 Points) True or False:

a) If $A \subseteq B \subseteq \Sigma^*$ and B is regular, then A is also regular True False

b) {w ε {a,b}* | w contains an even number of *a*'s} is Regular True False

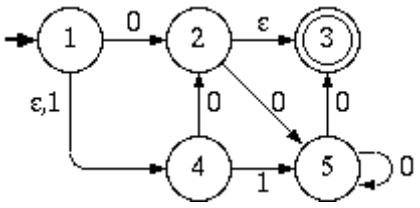
c) If N is an NFA, then there is an NFA accepting the complement of $\mathcal{L}(N)$ True False

d) If L1 ∩L2 is regular and L1 is regular, then L2 is regular. True False

e) If L1 ∩ L2 is regular and L1 is finite, then L2 is regular. True False

#2. (10 Points) Show that the language P consisting of balanced parentheses is not regular. For example, ((( )( ))( )) is a string in P.

#3. a) Minimize the following automaton and b) give the regular expression that represents the language accepted by the machine:



#4. Show that the question: "*Is regular expression r a subset of regular expression s*" is decidable.

#5. In the Product construction (See page 103 of Background Material 2 – Grahne Slides and class notes), the product transition function for machine L x M is given as:
δ_{LxM} ((p,q), a) = (δ_L(p,a), δ_M(q,a)) where p ε L and q ε M. Using this and the definition of δ*, show that δ_{LxM}*(q_L, q_M), w) = (δ_L^*(q, w), δ_M^*(q, w))