CS 332, M02.3: Finite State Machines, Practice Problems

1. Use this to practice making FSM's. Given $\Sigma = \{\ a, b\}$, create the machine M for:

   (a) $L_1 = a*$

   (b) $L_2 = (aba)*$

   (c) $L_3 = (bb)*$

   (d) $L_4 = (bb)*aa(bb)*$

   (e) $L_5 = aaaaa*b*bb$

   (f) $L_6 = a^* + b^*$

   (g) $L_7 = a^*b^* + b^*a^*$

   (h) $L_8 = a^+b^+a^+$

   (i) $L_9 = a(a+b)^*a$

   (j) $L_{10} = (a+b)^+bbb$

   (k) $L_{11} = a(a+b)^*a(a+b)^*a$

   (l) $L_{12} = (a+b)^*aa + (a+b)^*bb$

2. Let L be the language of strings containing only pairs of a's or b's for alphabet $\Sigma = \{a,\ b\}$. For example, $aabbaabbaa$, $bbbbbb$, $aaaabb$ and $bbbbaa$ are all in L, while aba, and $bbbaa$ are not in L. L does not include zero length strings, so at least one aa or bb pair must be present. The regular expression for $L = (aa \text{ OR } bb)^+$, which is more correctly written as $L = (aa + bb)^+$.

   (a) (10) Draw the machine, M, that corresponds to L.

   (b) (10) Define the machine M in terms of S, Σ, q_0, δ, and F.