1: Regular Expressions

(a)(3pts) For each of the following languages give two strings that are members of the language and two strings that are not. Assume that the alphabet is $\Sigma = \{a, b\}$

- $b^*ab^*ab^*$
- $(a \cup ba \cup bb)\Sigma^*$
- $(\epsilon \cup a)b^+$

(b)(2pts) Give a regular expression for the following language over alphabet $\Sigma = \{x, y\}$
$L_0 = \{w|$ w contains at least two $y's$ and at most one $x\}$

(c) (8pts) Give a regular expression for the following languages. The alphabet is $\{x, y\}$.

- $L_1 = \{w|$ w begins with y ends with $x\}$
- $L_2 = \{w|$ w the length of w is at most 4$\}$
- $L_3 = \{w|$ w starts with a y and has odd length, or starts with a x and has even length $\}$
- $L_4 = \{w|$ is any string except x and $yy\}$

(d)(5pts) Use the procedure described in class to convert the following regular expression to nondeterministic finite automata. You need to show your work and intermediate steps for full credit.

$$(y \cup xy^*)^*$$

(e)(7pts) Use the procedure described in class to convert the following FAs to regular expressions. You need to show the intermediate steps for full credit