Handout 3: Homework 1

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This assignment is due by the start of lecture on Wednesday, September 19.

1. Find languages L_1, L_2 over $\Sigma = \{0, 1\}$ for which $L_1 \not\subseteq L_2$, $L_2 \not\subseteq L_1$ and $(L_1 \cup L_2)^* = L_1^* \cup L_2^*$.

2. Show that the following languages are regular by giving FAs that exactly recognize them. For all languages, let $\Sigma = \{0, 1\}$.

   (a) $A_1 = \emptyset^*$.

   (b) $A_2 = \{w \mid w \text{ doesn't end with } 011\}$.

   (c) $A_3 = \{w \mid w \text{ contains an even number of 0s and an odd number of 1s}\}$.

   (d) $A_4 = \{w \mid w \text{ represents a binary number equivalent to } (0 \bmod 5) \text{ or } (2 \bmod 5)\}$. (Leading zeros are okay for A_4.)

3. For two of the above languages, provide regular expressions exactly recognizing them. Clearly indicate your choices.

4. Book, 1.31. [regular closure under reversal]

5. Book, 1.64. Parts (a) and (b) only. [on NFA sizes and string lengths]