CSC236 tutorial exercises, Week #12
best before Thursday evening

These exercises are intended to give you some practice manipulating regular expressions.

1. Let $\Sigma = \{0, 1\}$. For each language below provide a regular expression over Σ

    (a) $L_1 = \{x \in \Sigma \mid x$ has an even number of 1s or an odd number of 0s$\}$.

    (b) $L_2 = \{x \in \Sigma \mid x$ has at least one 1 and at least one 0$\}$.

    (c) $L_3 = \{x \in \Sigma \mid$ every 1 in x is immediately preceded and followed by a 0$\}$

2. Let $\Sigma = \{0, 1\}$, let $\mathcal{RE}$ be the regular expressions over Σ, and let $r_1, r_2, r_3 \in \mathcal{RE}$. Say whether each of the following is true or false, and justify your claim:

    (a) If $r_1 r_2 \equiv r_2 r_1$ and $r_1 \not\equiv \varepsilon \not\equiv r_2$ and $r_1 \not\equiv \emptyset \not\equiv r_2$, then $r_1 \equiv r_2$.

    (b) If $r_1 r_2 \equiv r_1 r_3$ and $r_1 \not\equiv \emptyset$, then $r_2 \equiv r_3$.