Math 166 - Theory of Computability - Winter 1999
Quiz #4 — February 4

1. Indicate whether true or false.

   (a) The expressions \((a^* b^*)^*\) and \((a \cup b)^*\) represent the same language.

   (b) For all \(L\), \(\epsilon\) is in \(L^*\).

   (c) For all \(L\), \(L \cap L \subseteq L^*\).

2. Give regular expressions which represent the following languages over \(\Sigma = \{a, b\}\).

   (a) \(L_1 = \{a^{2i} : i \in \mathbb{N}\}\).

   (b) \(L_2 = \{w : w \text{ contains exactly two } a's\}\).

   (c) \(L_3 = \{w : w \text{ contains an even number of } a's\}\).

   (d) \(L_4 = \{w : w \text{ contains an odd number of } a's\}\).

3. Convert the following DFA into a regular expression. To get full credit, you should use the method from the lecture and textbook (or should make it clear you are following an alternative method).