Answer the questions in 75 minutes.

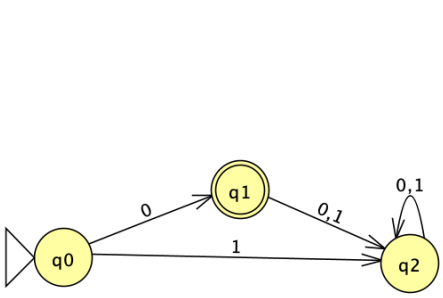
1. **(35 points)** Construct a deterministic finite automaton (DFA) to recognize the following language:

   $L = \{w \in \{0,1\}^* : w$ starts with at most three consecutive 0s and contain at least two consecutive 1s (e.g. $011000 \in L$, $0010 \notin L$.)

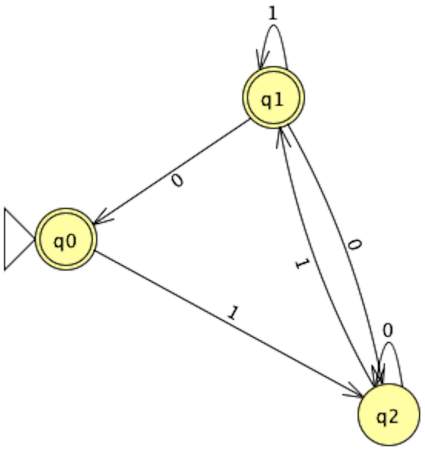
2. **(35 points)** Describe the equivalence classes ($\approx$) for the following language:

   The set of all strings beginning with a 1 that, when interpreted as a binary integer, is a multiple of 5. For example, strings 101, 1010, and 1111 are in the language; 0, 100, and 111 are not.

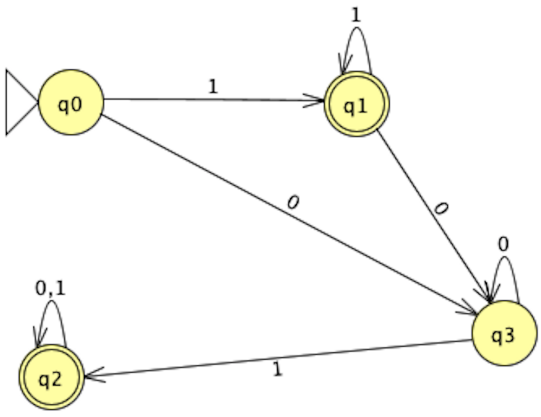
3. **(30 points)** Convert the following DFAs into equivalent regular expressions:



(a)



(b)



(c)