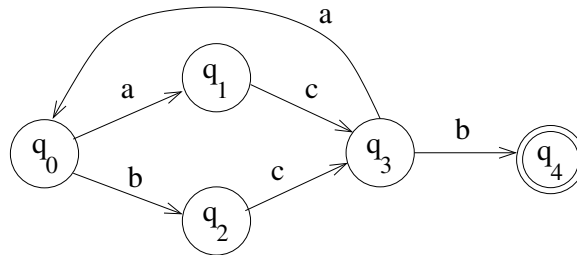


1. Convert the following DFA to a regular expression.



2. Let

$$L = \{s \mid s \text{ is a string of base 2 digits representing a number that is divisible by 3}\}$$

Prove that L is regular.

3. Prove that the class of regular languages is closed under set subtraction. I.e., if R_1 and R_2 are regular languages, then $R_1 - R_2$ is regular.

Hint: See Theorem 1.25 in Sipser.

4. For any string $w = w_1w_2\dots w_n$, the **reverse** of w , written w^R is the string $w^R = w_nw_{n-1}\dots w_1$. For any language A , let $A^R = \{w^R \mid w \in A\}$. Show that if A is regular, then A^R is also regular.

5. Let

$$L = \{a^n \mid n \text{ is a prime number}\}$$

Use the pumping lemma to prove the L is not regular.