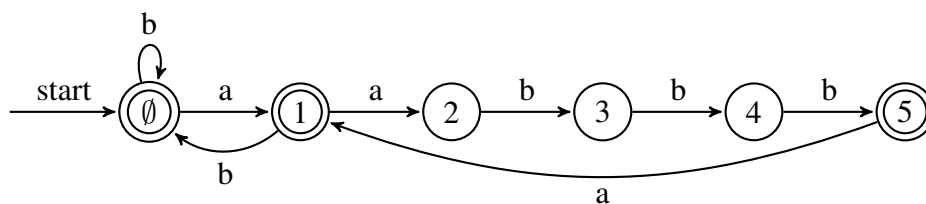# Homework 2
ECE 590

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Question 1:

NFA:

Question 2:

With alphabt $\{a, b, c\}$, there is no a after c

Regular expression:

$$(a|b)^* (c|b)^*$$

Question 3:

(a) $L = \left\{ a^{i^2} | i \in \mathbb{Z} \right\}$

    1. Pick $w = a^{p^2}$.

    2. $x = a^j$.
        $y = a^k$.
        $z = a^{p^2-j-k}$.

3. $n = 2$.

$xy^n z = xy^2 z = a^{p^2+k}$.

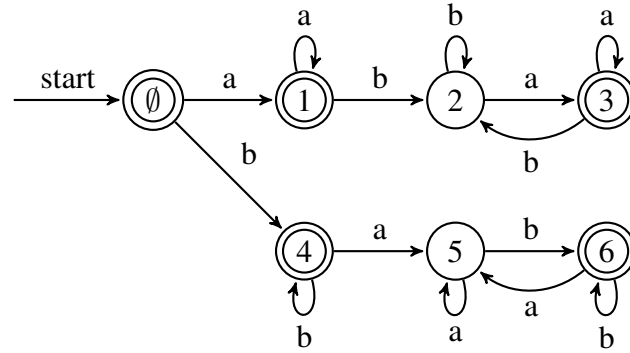Clearly p^2 is a perfect square number.

$\because p \geq |k| \geq 1$

$\therefore k \neq 0$

$\therefore p^2 < p^2 + k \leq p^2 + p < (p+1)^2$

$\therefore p^2 + k$ is not a perfect square number.

$\therefore L$ is not a regular expression.

(b) $L = \{w|w$ has an equal number of ab's and ba's $\}$

(c) $L = \{a^i b^j \,|\, (i \bmod 2) + 1 = j \bmod 3\}$