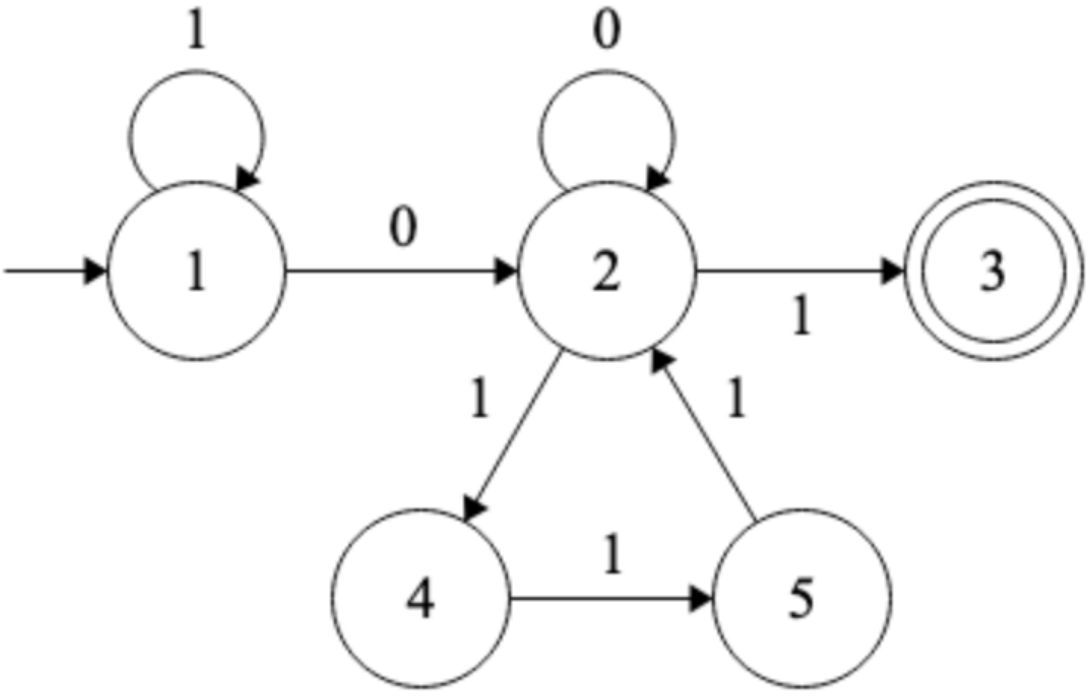
Section Questions

CS301, Week 05

1 NFA to Regex

Convert the following NFA to a Regex using the GNFA



1*0(0|111)*1

2 Irregularity Proof

Prove that the following language is non-regular.

$$L = \{w| \text{ w has more zeroes than ones}\}\Sigma = \{0, 1\}$$

Suppose for the sake of contradiction that L is regular.
Since L is regular, there must exist a DFA M with pumping length p that decides the language.
Let $s = 0^{p+1}1^p$.
By the pumping lemma, we can partition s into xyz where $|xy| \leq p$ and $|y| \geq 1$.
Therefore, $y = 0^k$ for some $k \geq 1$. Observe he string $s = xyz$ is in the language from our definition, but $xz = 0^{p+1-k}1^p$ cannot be in the language since $k \geq 1$ and the number of zeroes must be strictly greater than the number of ones.
Since the DFA cannot distinguish between these two, L must be irregular by contradiction.