To Prove: A language is regular if and only if it is accepted by a Multistart FA.

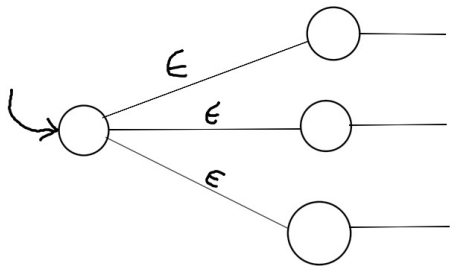
Proof:

There are two parts we need to prove,
1. If a language is Regular , then its is accepted by Multistart FA.
2. If a language is accepted by Multistart FA, then the language is Regular.

Part 1.

A language is regular if it is accepted by an NFA. NFA can be converted into an FA. Multistart FA is a FA with multiple start state. It behaves in a similar manner as an FA.
Therefore, a language is regular then it is accepted by MFA.

Part 2.



MFA to NFA

We can convert Multistart FA to NFA using an empty transition. Doing so, we get a new machine/automata which acts similar as an NFA.

NFA can be converted into a DFA which behaves as an FA.
Kleene's theorem states that any regular language is accepted by FA and conversely that any language accepted by FA is regular.
Therefore if a language is accepted by a Mulltistart FA, it is also accepted by an FA. FA can be expressed in terms of a regular expression. Hence the language is Regular.

Conclusion:
Therefore, we proved that a language is regular if and only if it is accepted by a mutlistart FA.