

Non-regular langs

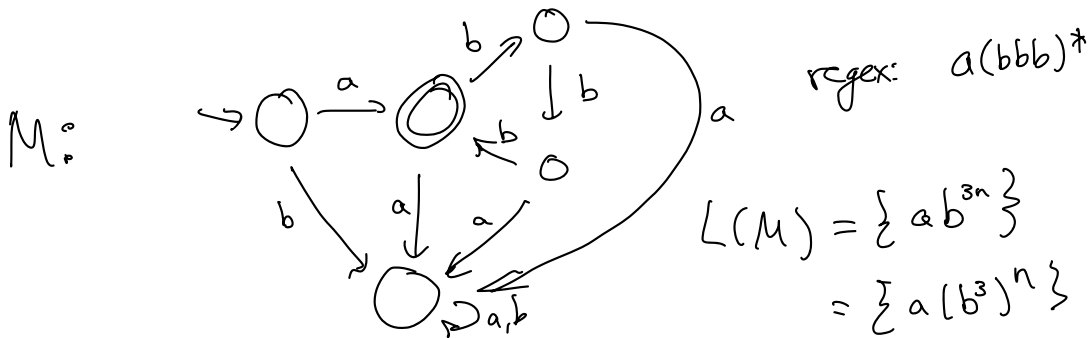
$\{a^n b^n\}$ is not regular.

$a^* b^*$ $\rightarrow$ $\{a^n b^m\}$ is regular.

A general method to show a lang is not regular:

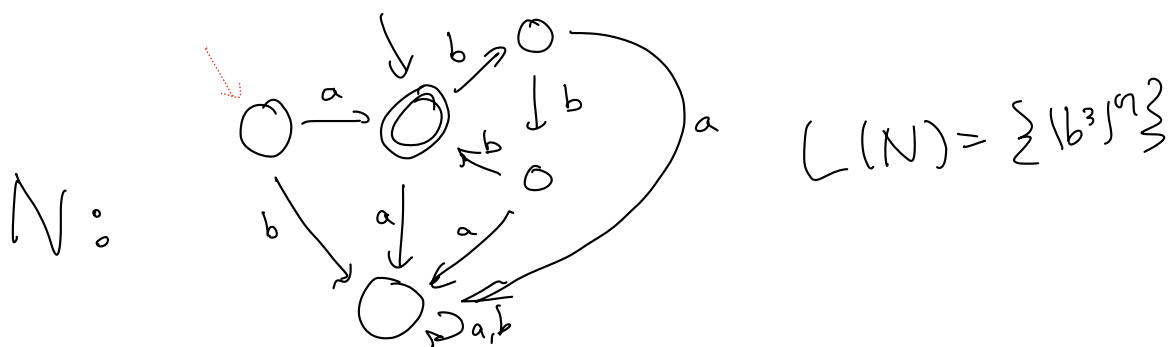
Brzozowski Derivative

In a DFA, if we move the starting state, how does it affect the language?



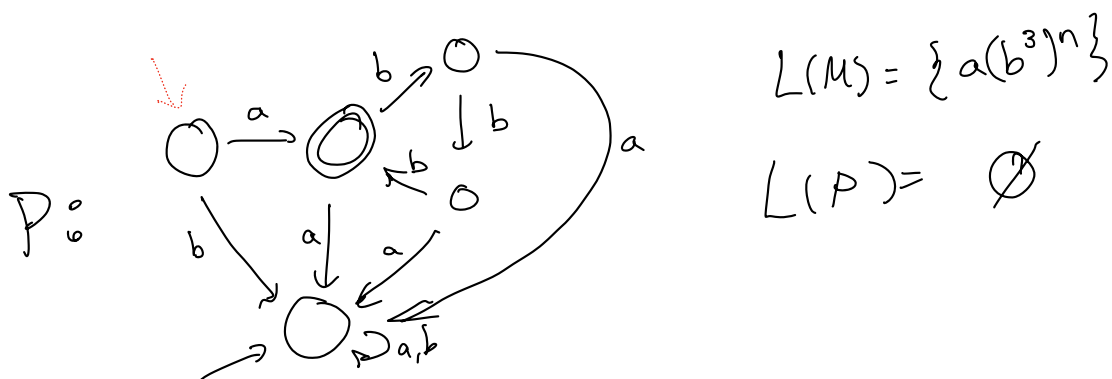
Move the start state:

$$L(M) = \{a(b^3)^n\}$$



Moving the start state thru an arrow labeled a causes initial a's to be deleted from the language.

Moving the start state changes the front of all strings in the language.



Move it to here, moving thru b arrow, should delete initial b's from the language. There were no strings beginning with b, so we end up with $\emptyset$.

"remove the initial a's" looks:

$$\{x \mid ax \in L(M)\}$$

removes the a from anything which started with a,
discards anything which doesn't start with a.

This is the B. Derivative with resp to a

written:

$$\left[\frac{d}{da} L(M) \right]$$

$$\frac{d}{da} \{a\} = \{\epsilon\}$$

$$\frac{\partial}{\partial x} x = 1$$

$$\frac{d}{da} \{b\} = \emptyset$$

$$\frac{\partial}{\partial x} y = 0$$

$$\text{So } \frac{d}{da} \{a(b^3)^n\} = \{(b^3)^n\}$$

$$\frac{d}{db} \{a(b^3)^n\} = \emptyset$$

$$\text{or } \frac{d}{d(ab)} \{a(b^3)^n\} = \{b^2(b^3)^n\}$$

$$\frac{d}{d(ba)} \{a(b^3)^n\} = \emptyset \quad (\text{none of these begin with } ba)$$

For any string x and any language L ,

$$\frac{d}{dx} L = \{ y \mid xy \in L \}$$

Let $E =$ set of English words

$\frac{d}{da} E$ contains: pple, ardvark
dvertisement
rtistic etc.

$$\frac{d}{d(bop)} E = \{ ped, per, pers, ping, s, \varepsilon \}$$