$$\text{let } f\ x\ y\ z = (x\ y)\ (y\ z)\ ;;$$

$$f : \underbrace{(('a \rightarrow 'b) \rightarrow ('b \rightarrow 'c))}_{\text{tipo di } x} \rightarrow \underbrace{('a \rightarrow 'b)}_{\text{" } y} \rightarrow \underbrace{'a}_{\text{" } z} \rightarrow \underbrace{'c}_{\text{" risult.}}$$

$$\text{let } f\ x\ y = (x\ y) = y\ ;;$$

$$f : \underbrace{('a \rightarrow 'a)}_{\text{" } x} \rightarrow \underbrace{'a}_{\text{" } y} \rightarrow \underbrace{\text{bool}}_{\text{" ris}} = \text{<fun>}$$

$f : \mathbb{N} \times \mathbb{N} \to \mathbb{Z}$

precedenza indotta su $\mathbb{N} \times \mathbb{N}$

$(n-2, m+1)$

$(n, m) \leftarrow$

$(n+2, m-1)$

$$\left.\begin{array}{c} (n, m) \\ | \\ (n+2, m-1) \\ \vdots \\ (2m+n, \emptyset) \end{array}\right\}$$

$$\left.\begin{array}{c} | \\ (2m+n-1, \emptyset) \\ | \\ \vdots \\ (\emptyset, \emptyset) \end{array}\right\}$$

$\left(\forall n, m \in \mathbb{N}.\ f(n, m) = 2n - 3m\right)$

dimostrare la proprietà sulla def. di f

$$f(n,m) = \begin{cases} 0 & \text{se } n = 0 \text{ e } m = 0 \\ -7 + f(\underline{n+2,\ m-1}) & \text{se } m > 0 \\ 2 + f(\underline{n-1,\ m}) & \text{se } m = 0 \text{ e } n > 0 \end{cases}$$

$$(n+2,\ m-1) < (n,m) \qquad m > 0$$

$$(n-1,\ 0) < (n,0) \qquad n > 0$$

$$\underline{f(n,m) = 2n - 3m}$$

Caso base

$$f(0,0) = 2\cdot 0 - 3\cdot 0$$

$$f(0,0)$$

$$= \{\text{def } f,\ 1^\circ \text{ caso}\}$$

$$0$$

$$= \{\text{calcolo}\}$$

$$2\cdot 0 - 3\cdot 0$$

Caso induttivo $\quad m+1>0, \; n-2>0$

$$f(n,m)=2n-3m \Rightarrow$$

$$f(n-2,m+1)=2(n-2)-3(m+1)$$

$$f(n+2,m-1)=2(n+2)-3(m-1)$$

$$\Rightarrow f(n,m)=2n-3m$$

$$\underbrace{f(n,m) = 2n - 3m}_{\text{ip. ind.}} \Rightarrow f(n-2, m+1) = 2(n-2) - 3(m+1)$$

$f(n-2, m+1)$

$= \{$ def f, $m+1>0$, 2° caso $\}$

$-7 + f(n, m)$

$= \{$ ip. ind.

$-7 + 2n - 3m$

$= \{$ calcolo $\}$

$2(n-2) - 3(m+1)$

$-4 + 2n = 2(n-2)$

$-3 - (3m) = -3(m+1)$

$$\underbrace{f(n,0) = 2n - 3 \cdot 0}_{\text{ip ind.}} \Rightarrow f(n+1,0) = 2(n+1) - 3 \cdot 0$$

$f(n+1,0)$

$= \{$ def f, 3° caso $\}$

$2 + f(n,0)$

$= \{$ ip. ind. $\}$

$2 + 2n - 3 \cdot 0$

$= \{$ calcolo $\}$

$2(n+1) - 3 \cdot 0$

$$\left.\begin{array}{l} S \to aSb \mid aA \\ A \to aA \mid a \end{array}\right\} G$$

dimostrare utilizzando il Teo. P. Fisso

che $aaab \in L_G$

$$S = \{a\}S\{b\} \cup \{a\}A$$

$$A = \{a\}A \cup \{a\}$$

$$T_S(S,A) = \{a\}S\{b\} \cup \{a\}A$$

$$T_A(S,A) = \{a\}A \cup \{a\}$$

$$\begin{cases} S = T_S(S,A) \\ A = T_A(S,A) \end{cases}$$

$$S^i = T_S^i(\{\},\{\})$$
$$A^i = T_A^i(\{\},\{\})$$

$$S^\emptyset = \{\}$$
$$A^\emptyset = \{\}$$

$$S^1 = \{\}$$
$$A^1 = \{a\}$$

$$S^2 = \{aa\}$$
$$A^2 = \{a, aa\}$$

$$S^3 = \{aaab, aa, aaa\}$$
$$A^3 = \{a, aa, aaa\}$$

Si def. ricorsivamente la funzione canc
con tipo

canc : 'a list → 'a → 'a list

tale che canc l x

cancella da l la prima occorrenza di x

es:

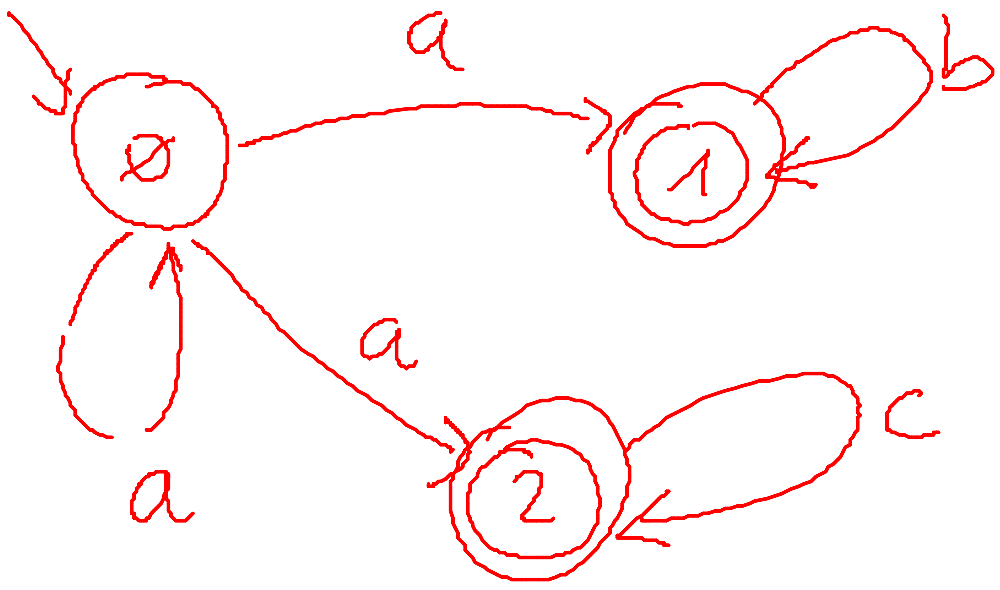
canc [3;4;5;4;2;9] 4 = [3;5;4;2;9]

canc [] 4 = []

canc [2;3] 4 = [2;3]

```
let rec conc l x = match l with
    [] -> []
  | y :: ys when x = y -> ys
  | y :: ys when x <> y -> y :: conc ys x;;
```

not (x = y)



ASFN

$\Sigma = \{a, b, c\}$

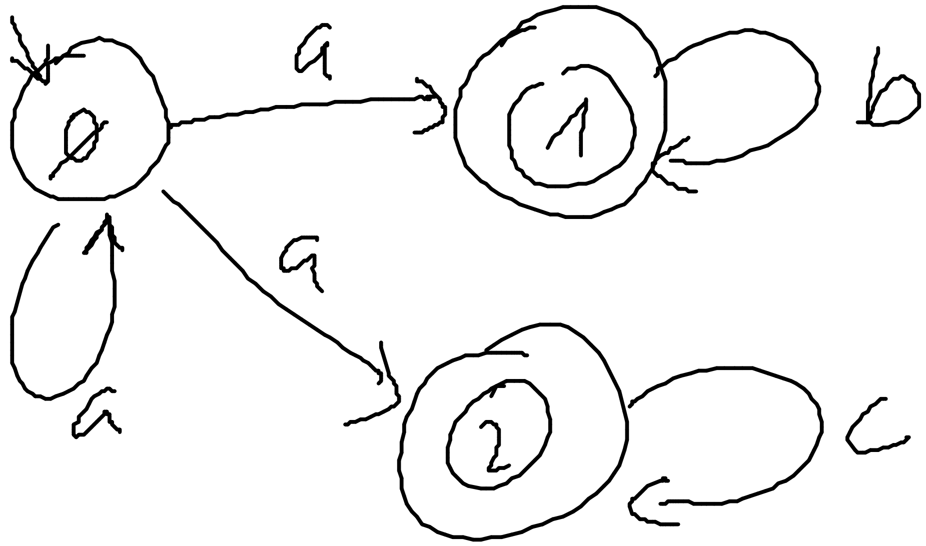
- Dire formalmente qual'è il ling. riconosciuto
- Trasformarlo in ASFD equivalente mediante costruzione di sottoinsiemi

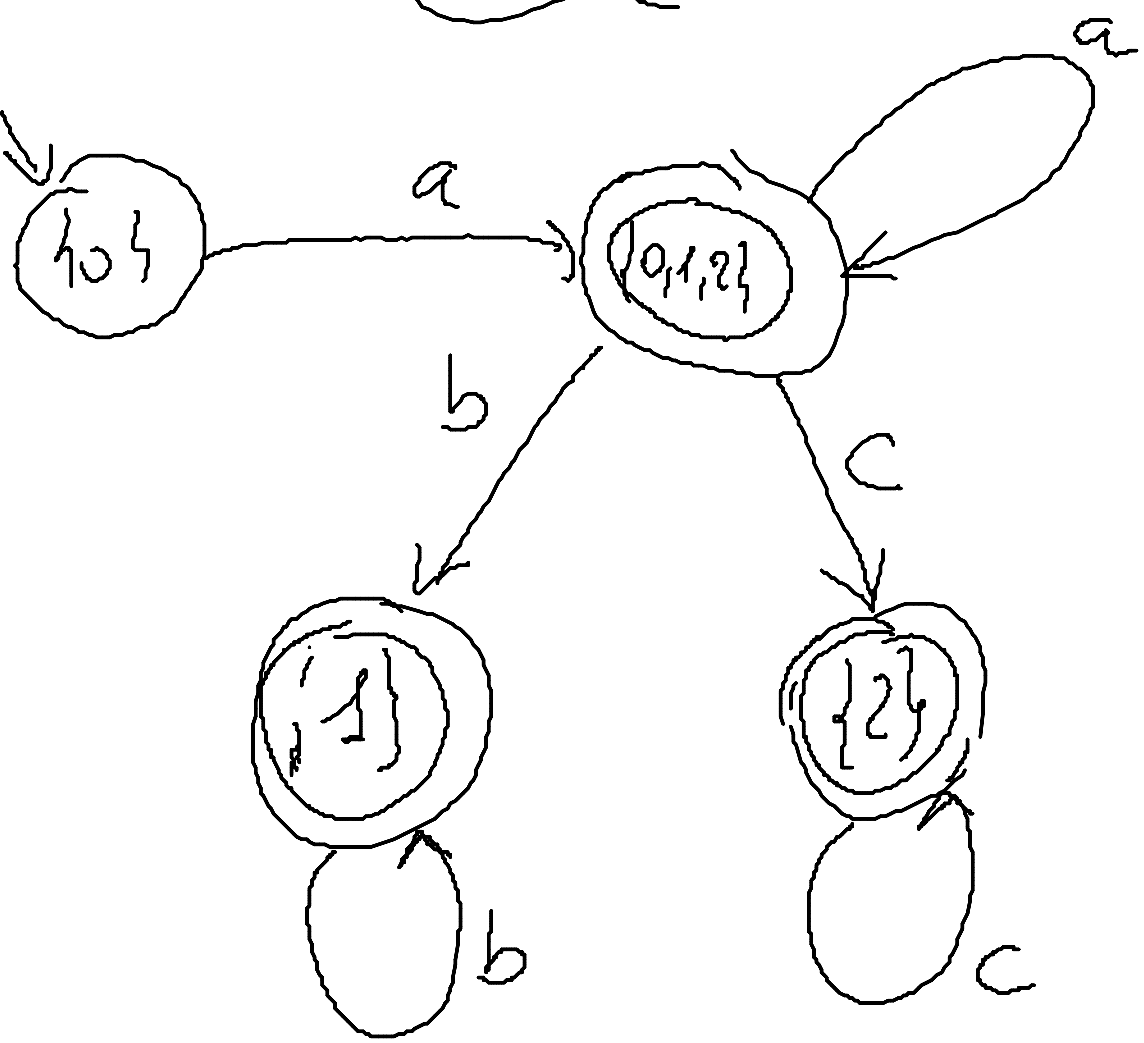
$$L = \{ a^n b^m \mid n > 0,\ m \geq 0 \} \cup \{ a^n c^m \mid n > 0,\ m \geq 0 \}$$

$$L = \{ a^n \mid n > 0 \} \cup \{ a^n b^m \mid n, m > \emptyset \} \cup$$

$$\{ a^n c^m \mid n, m > 0 \}$$

$$L = \{ a^n b^m c^k \mid n > 0 \text{ e } \underline{m} * \underline{k} = 0 \}$$


0
a
1
b
a
a
2
c


{0}
a
{0,1,2}
a
b
c
{1}
b
{2}
c