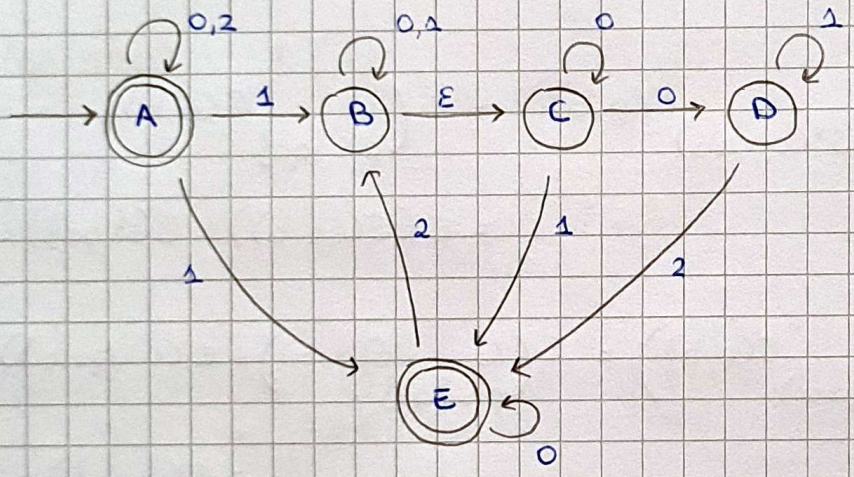
ESERCIZIO 2

Considerare l'automa N definito dal seguente diagramma di stato



a Determinare in dettaglio tutti gli elementi della quintupla che lo definisce.

$N = (Q, \Sigma, \delta, A, F)$

$Q = \{A, B, C, D, E\}$

$\Sigma = \{0, 1, 2\}$

$F = \{A, E\}$

δ:

	0	1	2	ε
* → A	{A}	{B, E}	{A}	∅
B	{B}	{B}	∅	{C}
C	{C, D}	{E}	∅	∅
D	∅	{D}	{E}	∅
* E	{E}	∅	{B}	∅

b. N accetta o meno le stringhe 1101, 1021, ε? Giustificare la risposta. Risposte non giustificate non sono valutate.

1. $\omega = 1101 \in L(N)$?

$\delta^*(A, 1101) = E\left(\bigcup_{p \in \delta^*(A,110)} \delta(p,1)\right) = E\left(\bigcup_{p \in \{B,C,D,E\}} \delta(p,1)\right)$

$= E(\delta(B,1) \cup \delta(C,1) \cup \delta(D,1) \cup \delta(E,1))$
$= E(\{B,E,D\}) = \{B,C,D,E\}$

$\delta^*(A, 110) = E\left(\bigcup_{p \in \delta^*(A,11)} \delta(p,0)\right) = E\left(\bigcup_{p \in \{B,C,E\}} \delta(p,0)\right)$

$= E(\delta(B,0) \cup \delta(C,0) \cup \delta(E,0))$
$= E(\{B,C,D,E\}) = \{B,C,D,E\}$

$\delta^*(A, 11) = E\left(\bigcup_{p \in \delta^*(A,1)} \delta(p,1)\right) = E\left(\bigcup_{p \in \{B,C,E\}} \delta(p,1)\right)$

$= E(\delta(B,1) \cup \delta(C,1) \cup \delta(E,1))$
$= E(\{B,E\}) = \{B,C,E\}$

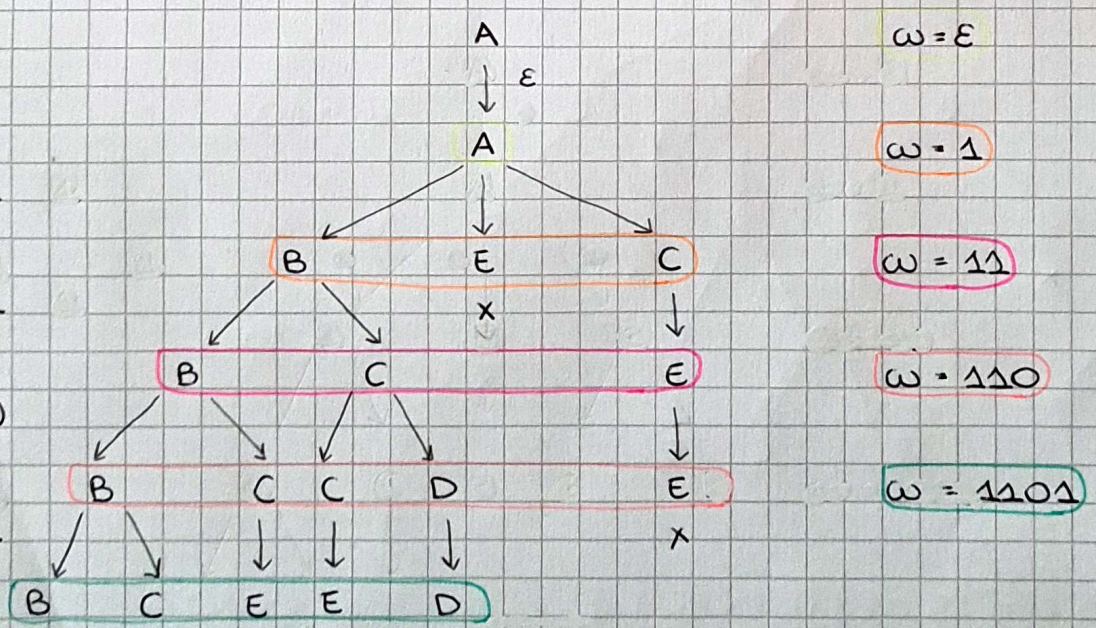
$\delta^*(A, 1) = E\left(\bigcup_{p \in \delta^*(A,\varepsilon)} \delta(p,1)\right) = E\left(\bigcup_{p \in \{A\}} \delta(p,1)\right) = E(\delta(A,1))$

$= E(\{B,E\}) = \{B,C,E\}$

$\delta^*(A, \varepsilon) = E(\{A\}) = \{A\}$

$\delta^*(A, 1101) \cap F = \{B,C,D,E\} \cap \{A,E\} = \{E\} \neq \emptyset \Rightarrow \omega \in L(N)$

Soluzione tramite albero delle computazioni.



$\delta^*(A, 1101) \cap F = \{B,C,D,E\} \cap \{A,E\} \neq \emptyset \Rightarrow \omega = 1101 \in L(N)$

2. $\omega = 1021 \in L(N)$?

$$\delta^*(A,1021) = E\left(\bigcup_{p \in \delta^*(A,102)} \delta(p,1)\right) = E\left(\bigcup_{p \in \{B,C,E\}} \delta(p,1)\right)$$

$$= E(\delta(B,1) \cup \delta(C,1) \cup \delta(E,1))$$
$$= E(\{B,E\}) = \{B,C,E\}$$

$$\delta^*(A,102) = E\left(\bigcup_{p \in \delta^*(A,10)} \delta(p,2)\right) = E\left(\bigcup_{p \in \{B,C,D,E\}} \delta(p,2)\right)$$

$$= E(\delta(B,2) \cup \delta(C,2) \cup \delta(D,2) \cup \delta(E,2))$$
$$= E(\{B,E\}) = \{B,C,E\}$$

$$\delta^*(A,10) = E\left(\bigcup_{p \in \delta^*(A,1)} \delta(p,0)\right) = E\left(\bigcup_{p \in \{B,E,C\}} \delta(p,0)\right) = E(\delta(B,0) \cup \delta(E,0) \cup \delta(C,0))$$

$$= E(\{B,C,D,E\}) = \{B,C,D,E\}$$

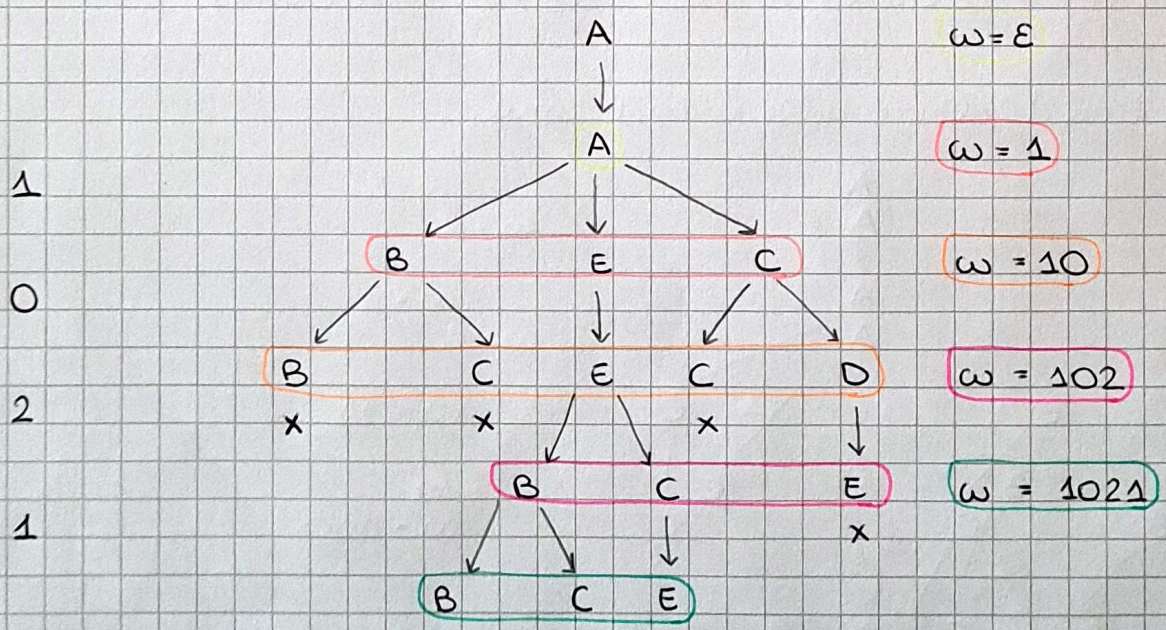
$$\delta^*(A,1) = E\left(\bigcup_{p \in \delta^*(A,\varepsilon)} \delta(p,1)\right) = E\left(\bigcup_{p \in \{A\}} \delta(p,1)\right) = E(\delta(A,1))$$

$$= E(\{B,E\}) = \{B,E,C\}$$

$$\delta^*(A,\varepsilon) = E(\{A\}) = \{A\}$$

$\delta^*(A,1021) \cap F = \{B,C,E\} \cap \{A,E\} \neq \emptyset \Rightarrow 1021 \in L(N)$

Soluzione tramite albero delle computazioni:



$\delta^*(A,1021) \cap F = \{B,C,E\} \cap \{A,E\} \neq \emptyset \Rightarrow \omega = 1021 \in L(N)$

3. $\omega = \varepsilon \in L(N)$?

$$\delta^*(A, \varepsilon) \cap F = E(\{A\}) \cap F = \{A\} \cap F = \{A\} \cap \{A, E\} \neq \emptyset \Rightarrow \omega = \varepsilon \in L(N)$$