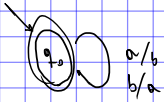
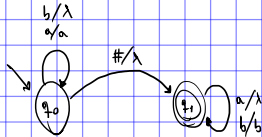


1. Para cada una de las siguientes relaciones dar un traductor finito que la compute. Hacerlo determinístico en los casos en que sea posible.

a) $\{(a^i b^j, b^i a^j) \mid i, j \geq 1\}$



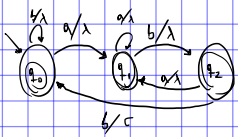
b) $\{(\omega \# \gamma, a^i b^j) \mid \omega, \gamma \in \{a, b\}^* \wedge i = |\omega|_a \wedge j = |\gamma|_b\}$



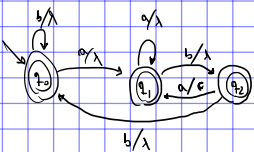
c) $\{(\omega \gamma, a^i b^j) \mid \omega, \gamma \in \{a, b\}^* \wedge i = |\omega|_a \wedge j = |\gamma|_b\}$



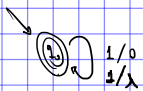
d) $\{(\omega, c^i) \mid \omega \in \{a, b\}^* \wedge i = (\text{cantidad de apariciones de } abb \text{ en } \omega)\}$



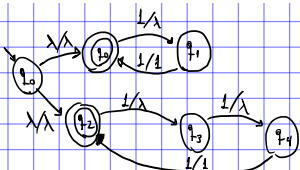
e) $\{(\omega, c^i) \mid \omega \in \{a, b\}^* \wedge i = (\text{cantidad de apariciones de } aba \text{ en } \omega)\}$



f) $\{(1^i, 0^j) \mid i \geq j\}$

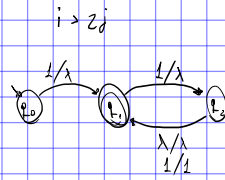
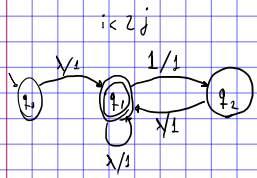
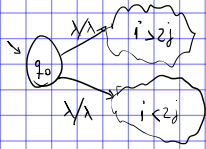


g) $\{(1^i, 1^j) \mid i = 2j \vee i = 3j\}$

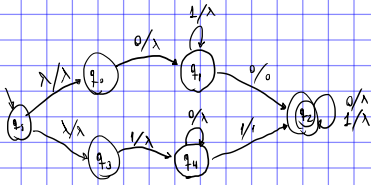


h) $\{(1^i, 1^j) \mid i \neq 2j\}$

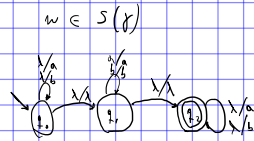
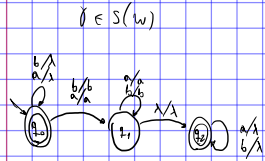
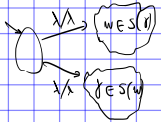
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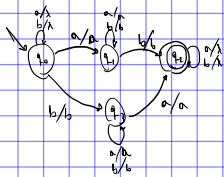
i) $\{(\omega, x) \mid \omega \in \{0, 1\}^* \wedge x \in \{0, 1\} \wedge |\omega|_x \geq 2\}$



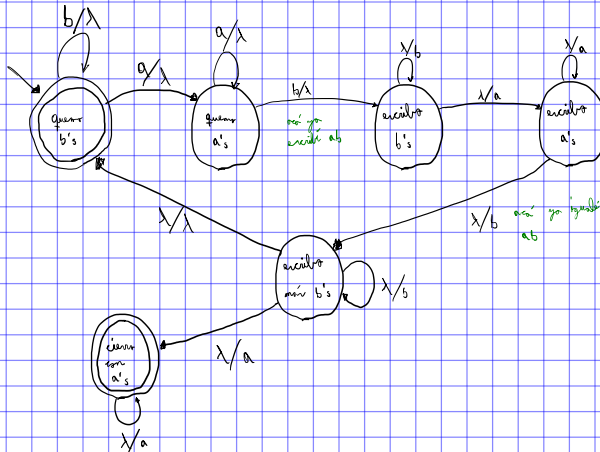
j) $\{(\omega, \gamma) \mid \omega, \gamma \in \{a, b\}^* \wedge (\omega \text{ es subcadena de } \gamma \vee \gamma \text{ es subcadena de } \omega)\}$



k) $\{(\omega, \gamma) \mid \omega, \gamma \in \{a, b\}^* \wedge \gamma \text{ es subcadena de } \omega \wedge \text{ el primer y último símbolo de } \gamma \text{ son distintos}\}$



l) $\{(\omega, \gamma) \mid \omega, \gamma \in \{a, b\}^* \wedge \text{ la cadena } ab \text{ aparece la misma cantidad de veces en } \omega \text{ que en } \gamma\}$



$$m) \{(\omega, \gamma) \mid \omega, \gamma \in \{a, b\}^* \wedge |\omega|_a = |\gamma|_a\}$$

