Lista de Exercícios de Máquina de Turing Reconhecedora

$$\begin{split} L_1 &= \left\{ a^n b^n / \, n \ge 0 \right\} \\ L_2 &= \left\{ a^n b^m c^n / \, n \ge 0 \right\} \\ L_3 &= \left\{ a^n b^{2n} / \, n \ge 0 \right\} \\ L_4 &= \left\{ a^{2n} b^n / \, n \ge 0 \right\} \\ L_5 &= \left\{ a^n b^m c^m d^n / \, n \ge 0 \, e \, m \ge 0 \right\} \\ L_6 &= \left\{ w \in \left\{ a, b \right\}^* / |w|_a = |w|_b \right\} \\ L_7 &= \left\{ a^n b^{3m} c^m d^{2n} / \, n \ge 0 \, e \, m \ge 0 \right\} \\ L_8 &= \left\{ a^i b^j c^k / \, i = j + k, \, e \, j \ge 0 \, e \, k \ge 0 \right\} \\ L_9 &= \left\{ a^i b^j c^k / \, k = i + j, \, i \ge 0, \, j \ge 0 \right\} \\ L_{10} &= \left\{ a^i b^j c^k / \, j = i + k, \, j \ge 0, \, k \ge 0 \right\} \\ L_{11} &= \left\{ a^n b^n c^m d^m / \, n \ge 0, \, m > 0 \right\} \\ L_{12} &= \left\{ a^n b^{2n+1} / \, n > 0 \right\} \\ L_{13} &= \left\{ a^n b^{2n+2} / \, n > 0 \right\} \\ L_{14} &= \left\{ a^n b^{n/2} / \, n > 0 \, e \, n \, \text{\'e} \, \text{\'m\'ultiplo de 3} \right\} \\ L_{15} &= \left\{ a^n b^{n/3} / \, n > 0 \, e \, n \, \text{\'e} \, \text{\'m\'ultiplo de 3} \right\} \\ L_{16} &= \left\{ a^n b^n c^n / \, n \ge 0 \right\} \\ L_{17} &= \left\{ a^n b^{2n} c^{3n} / \, n \ge 0 \right\} \\ L_{18} &= \left\{ w \in \left\{ a, b, c \right\}^* / |w|_a = |w|_b = |w|_c \right\} \\ L_{19} &= \left\{ w \in \left\{ a, b \right\}^* / |w|_a = 2 \, * |w|_b \right\} \\ L_{20} &= \left\{ w \in \left\{ a, b \right\}^* / w \, \text{\'e} \, \text{pal\'indromo} \right\} \end{split}$$