**Lista 3 LMD**

**Turing Machine Simulator**

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Exercício 1:

// Input: a unary number n

// Ouput: a binary number n’

// Example: 111 is 11

// Unary to Binary Algorithm

// for Turing Machine Simulator

// turingmachinesimulator.com

name: Unary to Binary

init: q0

accept: qf

q0, 1

q1, x, <

q0, y

q0, y, >

q0, x

q0, x, >

q0, \_

q3, \_, <

q1, \_

q0, z, >

q1, y

q0, z, >

q1, x

q1, x, <

q1, z

q1, y, <

q3, y

q3, 0, <

q3, z

q3, 1, <

q3, x

q3, \_, <

q3, \_

qf,\_, -

Exercício 2:

// Input: a binary number n on tape 1

// Ouput: a unary number n’ on tape 2

// Binary to Unary Algorithm

// for Turing Machine Simulator

// turingmachinesimulator.com

name: Binary to Unary

init: qinit

accept: qf

qinit, 1, \_

qinit, 1, \_, >, -

qinit, 0, \_

qinit, 0, \_, >, -

qinit, \_, \_

q0, \_, \_, <, -

q0, 0, \_

q0, 1, \_, <, -

q0, 1, \_

q1, 0, \_, >, -

q0, \_, \_

q2, \_, \_, >, -

q2, 1, \_

q2, \_, \_, >, -

q1, 1, \_

q1, 1, \_, >, -

q1, \_, \_

q0, \_, 1, <, <

Exercício 3:

// Input: a binary number n

// Ouput: accepts if n mod 2 == 0

// Example: accepts 110

// Divisible by 2 Algorithm

// for Turing Machine Simulator

// turingmachinesimulator.com

name: Binary numbers divisible by 2

init: q0

accept: qAccept

q0,0

q0,0,>

q0,1

q0,1,>

q0, \_

qBack, \_, <

qBack, 0

qAccept, 0, -

qBack, 1

q1, 1, -

Exercício 4:

// Input: a chain of a's and b's

// Ouput: unary length of the chain

// Example: abbaaab is 1111111

// Unary Length Algorithm

// for Turing Machine Simulator

// turingmachinesimulator.com

name: Unary Length

init: q0

accept: qend

q0, a

q0, 1, >

q0, b

q0, 1, >

q0, \_

qend, \_, -