act4-1

Actividad 3.3 Practicando las máquinas de Turing

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1. $L_1 = \{\#x_1\#x_2\#\cdots\#x_k \mid \text{cada } x_i \in \{0,1\}^* \text{ y } x_i \neq x_j \text{ para cada } i \neq j\}.$

Donde h equivale al símbolo $\#$.

Para realizar pruebas de esta máquina de Turing se puede evaluar en:

https://turingmachine.io/

Con el siguiente código:

```
input: 'hh01h0101h0100'
blank: ' '
start state: q1
table:
  q1:
    h: {write: H, R: q2}
```

```
q2:
  0: R
  1: R
  h: {write: E, R: q3}
q3:
  X: R
  Y: R
  0: {write: X, L: q20}
  1: {write: Y, L: q21}
  h: {L: q22}
q4:
  0: L
  1: L
  h: L
  ' ': {R: q6}
  H: {R: q6}
  X: {R: q6}
  Y: {R: q6}
q5:
  0: L
  1: L
  h: L
  ' ': {R: q7}
  H: {R: q7}
  X: {R: q7}
  Y: {R: q7}
q6:
  0: {write: X, R: q9}
  1: {L: q8}
  h: {L: q8}
  E: {write: h, R: q15}
q7:
  1: {write: Y, R: q9}
  0: {L: q8}
  h: {L: q8}
  E: {write: h, R: q15}
q8:
  X: {write: 0, L}
  Y: {write: 1, L}
  H: {R: q10}
  E: L
q9:
  0: {R: q14}
  1: {R: q14}
  h: {R: q14}
  E: {R: q18}
q10:
  0: R
  1: R
  h: {write: H, R: q11}
  E: {write: h, R: q15}
q11:
  0: R
  1: R
  h: R
  E: {R: q12}
q12:
  X: {write: 0, R}
```

```
        Y: {write: 1, R}
        0: {L: q13}
        1: {L: q13}
        h: {L: q13}
        ' ': {L: q13}
    q13:
        0: L
        1: L
        E: {R: q3}
    q14:
        0: R
        1: R
        h: R
        E: {R: q3}
    q15:
        X: {write: 0, R}
        Y: {write: 1, R}
        0: R
        1: R
        ' ': {L: qaccept}
        h: {write: E, L: q16}
    q16:
        0: L
        1: L
        H: {write: h, L}
        h: L
        ' ': {R: q19}
    q17:
        0: R
        1: R
        h: R
        E: {R: q3}
    q18:
        X: R
        Y: R
        h: {L: qrej}
        ' ': {L: qrej}
        0: {L: q8}
        1: {L: q8}
    q19:
        h: {write: H, R: q17}
    q20:
        X: L
        Y: L
        E: {L: q4}
    q21:
        X: L
        Y: L
        E: {L: q5}
    q22:
        E: {L: q23}
        H: {R: q24}
    q23:
        0: L
        1: L
        h: {L: q25}
        H: {L: qrej}
    q24:
```
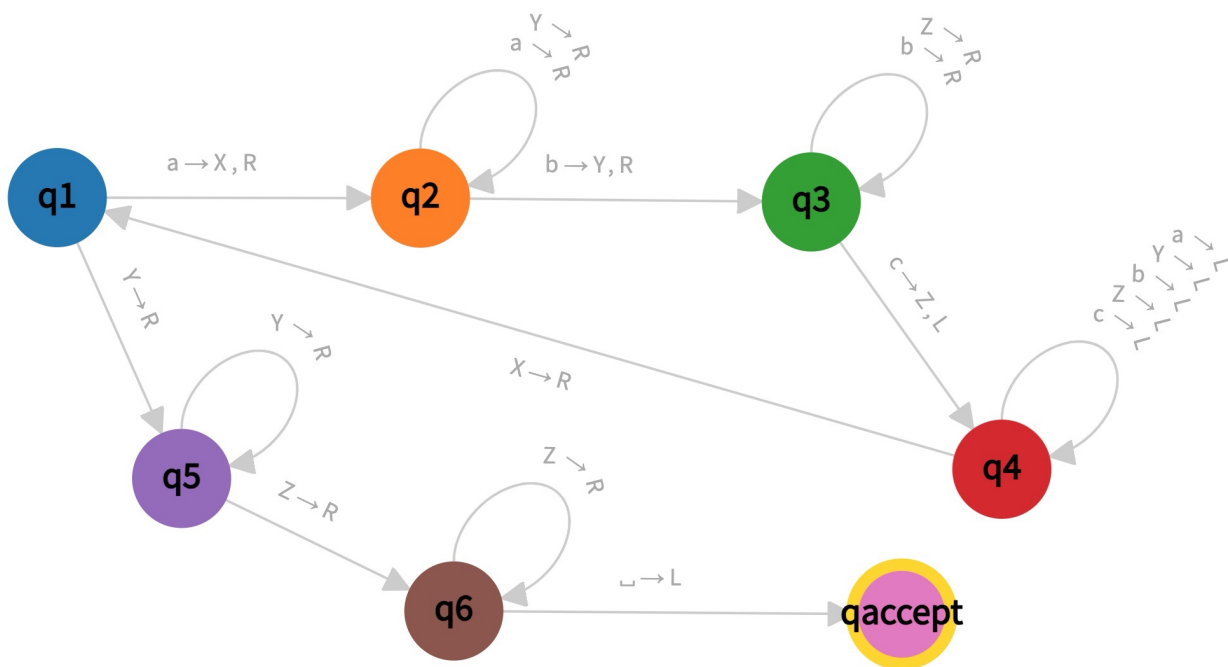
```
      h: {write: H, R: q11}
   q25:
      0: {L: q23}
      1: {L: q23}
      h: {R: qrej}
      H: {L: qrej}
   qaccept:
   qrej:
```

2. $L_2 = \{a^n b^n c^n \mid n \geq 1\}$.
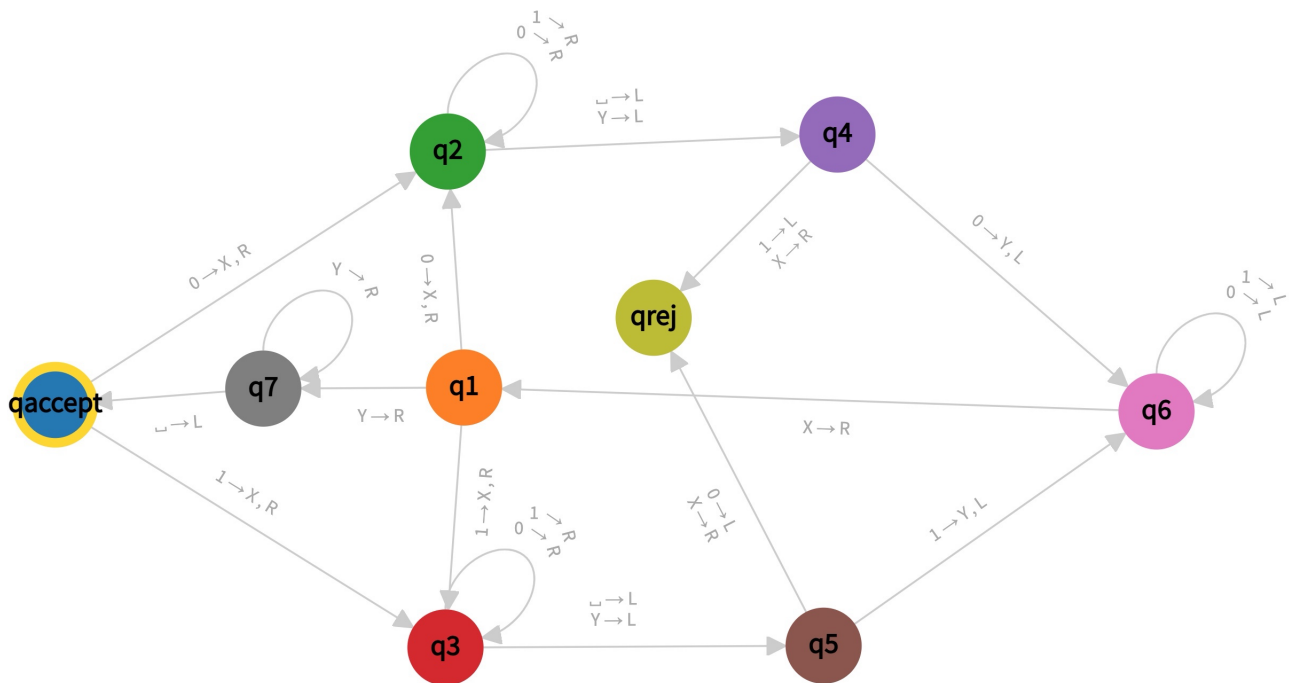
```
input: 'aaabbbccc'
blank: ' '
start state: q1
table:
  q1:
    a: {write: X, R: q2}
    Y: {R: q5}
  q2:
    a: R
    Y: R
    b: {write: Y, R: q3}
  q3:
    b: R
    Z: R
    c: {write: Z, L: q4}
  q4:
    c: L
```

```
      Z: L
      b: L
      Y: L
      a: L
      X: {R: q1}
    q5:
      Y: R
      Z: {R: q6}
    q6:
      Z: R
      ' ': {L: qaccept}
    qaccept:
```

3. $L_3 = \{ww^R \mid w \in \{0,1\}^*\}.$

```
input: '001100'
blank: ' '
start state: qaccept
table:
  qaccept:
    0: {write: X, R: q2}
    1: {write: X, R: q3}
  q1:
    0: {write: X, R: q2}
    1: {write: X, R: q3}
    Y: {R: q7}
  q2:
    0: R
    1: R
```

```
    Y: {L: q4}
    ' ': {L: q4}
q3:
  0: R
  1: R
  Y: {L: q5}
  ' ': {L: q5}
q4:
  0: {write: Y, L: q6}
  1: {L: qrej}
  X: {R: qrej}
q5:
  1: {write: Y, L: q6}
  0: {L: qrej}
  X: {R: qrej}
q6:
  0: L
  1: L
  X: {R: q1}
q7:
  Y: R
  ' ': {L: qaccept}
qrej:
```

```
    Y: {L: q4}
    ' ': {L: q4}
q3:
  0: R
  1: R
```