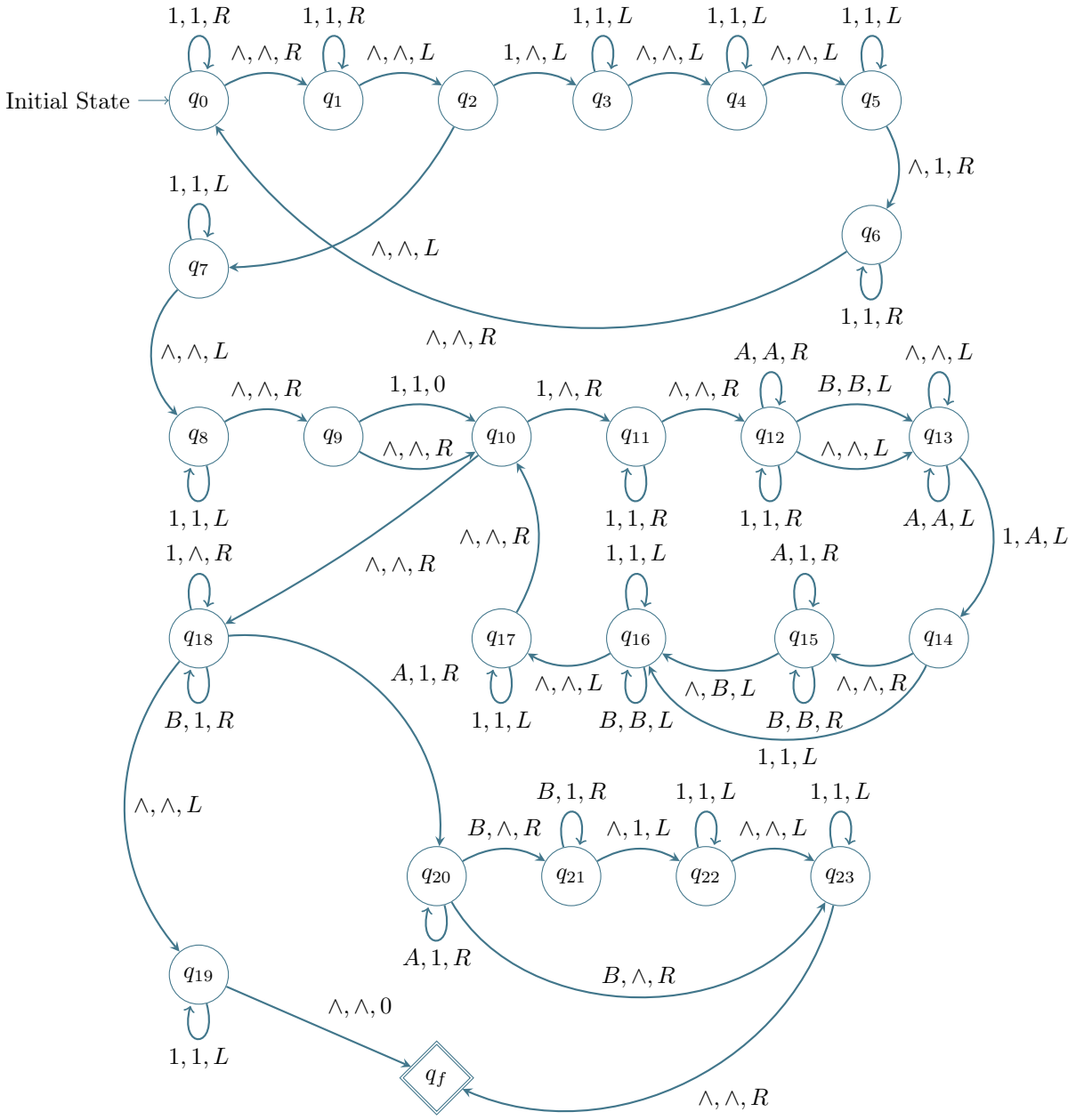
Mod/Div Turing Machine

Individual Coursework
F29FB, Spring 2022

Submitted by

Yoav Levi
H00347035

1 Graph


Initial State
q_0
q_1
q_2
q_3
q_4
q_5
q_6
q_7
q_8
q_9
q_{10}
q_{11}
q_{12}
q_{13}
q_{14}
q_{15}
q_{16}
q_{17}
q_{18}
q_{19}
q_{20}
q_{21}
q_{22}
q_{23}
q_f
$1,1,R$
$\wedge,\wedge,R$
$1,1,R$
$\wedge,\wedge,L$
$1,\wedge,L$
$1,1,L$
$\wedge,\wedge,L$
$1,1,L$
$\wedge,\wedge,L$
$1,1,L$
$\wedge,1,R$
$1,1,L$
$\wedge,\wedge,L$
$1,1,R$
$\wedge,\wedge,R$
$\wedge,\wedge,L$
$\wedge,\wedge,R$
$1,1,0$
$\wedge,\wedge,R$
$1,\wedge,R$
$\wedge,\wedge,R$
A,A,R
B,B,L
$\wedge,\wedge,L$
$1,1,L$
$1,1,R$
$1,1,R$
A,A,L
$1,A,L$
$\wedge,\wedge,R$
$\wedge,\wedge,R$
$1,\wedge,R$
$1,1,L$
$A,1,R$
$A,1,R$
$\wedge,\wedge,L$
$\wedge,B,L$
$\wedge,\wedge,R$
$B,1,R$
$1,1,L$
B,B,L
B,B,R
$1,1,L$
$\wedge,\wedge,L$
$B,1,R$
$B,\wedge,R$
$1,1,L$
$\wedge,1,L$
$1,1,L$
$\wedge,\wedge,L$
$A,1,R$
$B,\wedge,R$
$1,1,L$
$\wedge,\wedge,0$
$\wedge,\wedge,R$

2 Mathematical Notation

$s_0 \equiv \wedge, s_1 \equiv 1, s_2 \equiv A, s_3 \equiv B$

$$
\begin{aligned}
&M_g = \{\\
&((q_0, s_1) \to (q_0, s_1, R)),\\
&((q_0, s_0) \to (q_1, s_0, R)),\\
&((q_1, s_1) \to (q_1, s_1, R)),\\
&((q_1, s_0) \to (q_2, s_0, L)),\\
&((q_2, s_0) \to (q_7, s_0, L)),\\
&((q_2, s_1) \to (q_3, s_0, L)),\\
&((q_3, s_1) \to (q_3, s_1, L)),\\
&((q_3, s_0) \to (q_4, s_0, L)),\\
&((q_4, s_1) \to (q_4, s_1, L)),\\
&((q_4, s_0) \to (q_5, s_0, L)),\\
&((q_5, s_1) \to (q_5, s_1, L)),\\
&((q_5, s_0) \to (q_6, s_1, R)),\\
&((q_6, s_1) \to (q_6, s_1, R)),\\
&((q_6, s_0) \to (q_0, s_0, R)),\\
&((q_7, s_1) \to (q_7, s_1, L)),\\
&((q_7, s_0) \to (q_8, s_0, L)),\\
&((q_8, s_1) \to (q_8, s_1, L)),\\
&((q_8, s_0) \to (q_9, s_0, R)),\\
&((q_9, s_1) \to (q_{10}, s_1, 0)),\\
&((q_9, s_0) \to (q_{10}, s_0, R)),\\
&((q_{10}, s_1) \to (q_{11}, s_0, R)),\\
&((q_{10}, s_0) \to (q_{18}, s_0, R)),\\
&((q_{11}, s_1) \to (q_{11}, s_1, R)),\\
&((q_{11}, s_0) \to (q_{12}, s_0, R)),\\
&((q_{12}, s_1) \to (q_{12}, s_1, R)),\\
&((q_{12}, s_2) \to (q_{12}, s_2, R)),\\
&((q_{12}, s_3) \to (q_{13}, s_3, L)),\\
&((q_{12}, s_0) \to (q_{13}, s_0, L)),\\
&((q_{13}, s_0) \to (q_{13}, s_0, L)),\\
&((q_{13}, s_2) \to (q_{13}, s_2, L)),\\
&((q_{13}, s_1) \to (q_{14}, s_2, L)),\\
&((q_{14}, s_0) \to (q_{15}, s_0, R)),\\
&((q_{14}, s_1) \to (q_{16}, s_1, L)),\\
&((q_{15}, s_2) \to (q_{15}, s_1, R)),\\
&((q_{15}, s_3) \to (q_{15}, s_3, R)),\\
&((q_{15}, s_0) \to (q_{16}, s_3, L)),\\
&((q_{16}, s_1) \to (q_{16}, s_1, L)),\\
&((q_{16}, s_3) \to (q_{16}, s_3, L)),\\
&((q_{16}, s_0) \to (q_{17}, s_0, L)),\\
&((q_{17}, s_1) \to (q_{17}, s_1, L)),\\
&((q_{17}, s_0) \to (q_{10}, s_0, R)),\\
&((q_{18}, s_1) \to (q_{18}, s_0, R)),\\
&((q_{18}, s_3) \to (q_{18}, s_1, R)),\\
&((q_{18}, s_0) \to (q_{19}, s_0, L)),\\
&((q_{19}, s_1) \to (q_{19}, s_1, L)),\\
&((q_{19}, s_0) \to (q_f, s_0, 0)),\\
&((q_{18}, s_2) \to (q_{20}, s_1, R)),\\
&((q_{20}, s_2) \to (q_{20}, s_1, R)),\\
&((q_{20}, s_3) \to (q_{21}, s_0, R)),\\
&((q_{20}, s_0) \to (q_{23}, s_0, L)),\\
&((q_{21}, s_3) \to (q_{21}, s_1, R)),\\
&((q_{21}, s_0) \to (q_{22}, s_1, L)),\\
&((q_{22}, s_1) \to (q_{22}, s_1, L)),\\
&((q_{22}, s_0) \to (q_{23}, s_0, L)),\\
&((q_{23}, s_1) \to (q_{23}, s_1, L)),\\
&((q_{23}, s_0) \to (q_f, s_0, R)),\\
&\}
\end{aligned}
$$

3 Input 3, 5

$s_0 \equiv \wedge, s_1 \equiv 1, s_2 \equiv A, s_3 \equiv B$

(i)

(ii)