

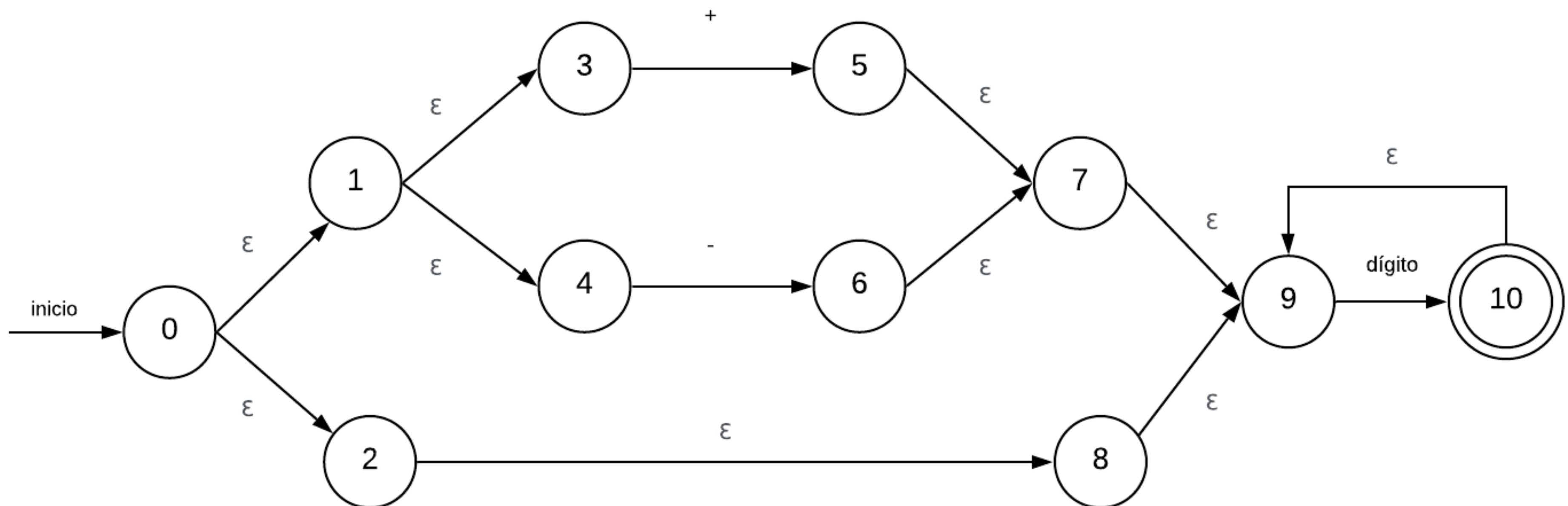
Construcción AFD'S – Juan Fernando Alzate Gómez – Grupo 9

Autómata Entero

Expresión Regular: $(+|-|\epsilon)\text{digito}^+$

digito - $\rightarrow [0-9]$

AFN



$$cerradura\mathcal{E}(S_0) = cerradura\mathcal{E}(0) = \{0,1,2,3,4,8,9\} = A$$

$$u = cerradura\mathcal{E}(mueve(A, +)) = cerradura\mathcal{E}(\{5\}) = \{5,7,9\} = B$$

$$u = cerradura\mathcal{E}(mueve(A, -)) = cerradura\mathcal{E}(\{6\}) = \{6,7,9\} = C$$

$$u = cerradura\mathcal{E}(mueve(A, digito)) = cerradura\mathcal{E}(\{10\}) = \{9,10\} = D$$

$$u = cerradura\mathcal{E}(mueve(B, +)) = ---$$

$$u = cerradura\mathcal{E}(mueve(B, -)) = ---$$

$$u = cerradura\mathcal{E}(mueve(B, digito)) = cerradura\mathcal{E}(\{10\}) = \{9,10\} = D$$

$$u = cerradura\mathcal{E}(mueve(C, +)) = ---$$

$$u = cerradura\mathcal{E}(mueve(C, -)) = ---$$

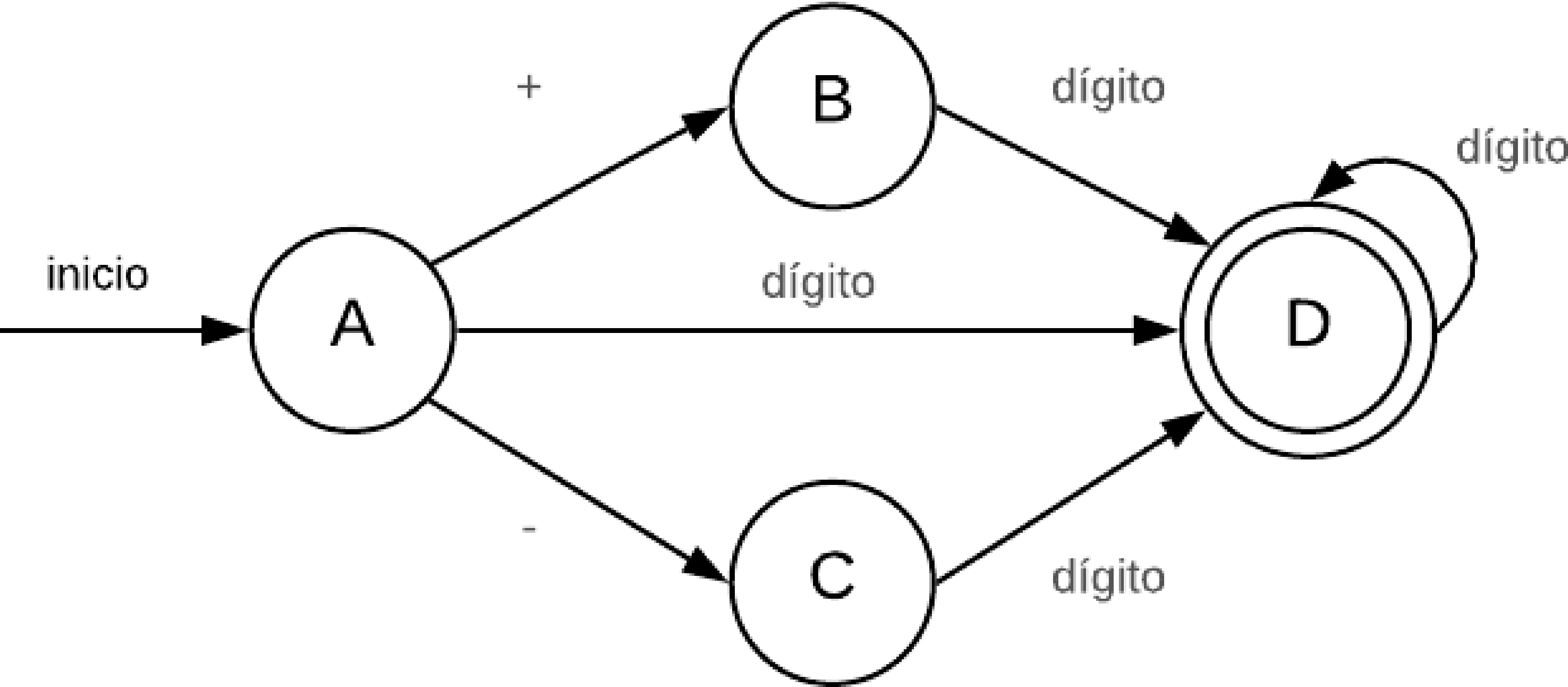
$$u = cerradura\mathcal{E}(mueve(C, digito)) = cerradura\mathcal{E}(\{10\}) = \{9,10\} = D$$

$$u = cerradura\mathcal{E}(mueve(D, +)) = ---$$

$$u = cerradura\mathcal{E}(mueve(D, -)) = ---$$

$$u = cerradura\mathcal{E}(mueve(D, digito)) = cerradura\mathcal{E}(\{10\}) = \{9,10\} = D$$

AFD

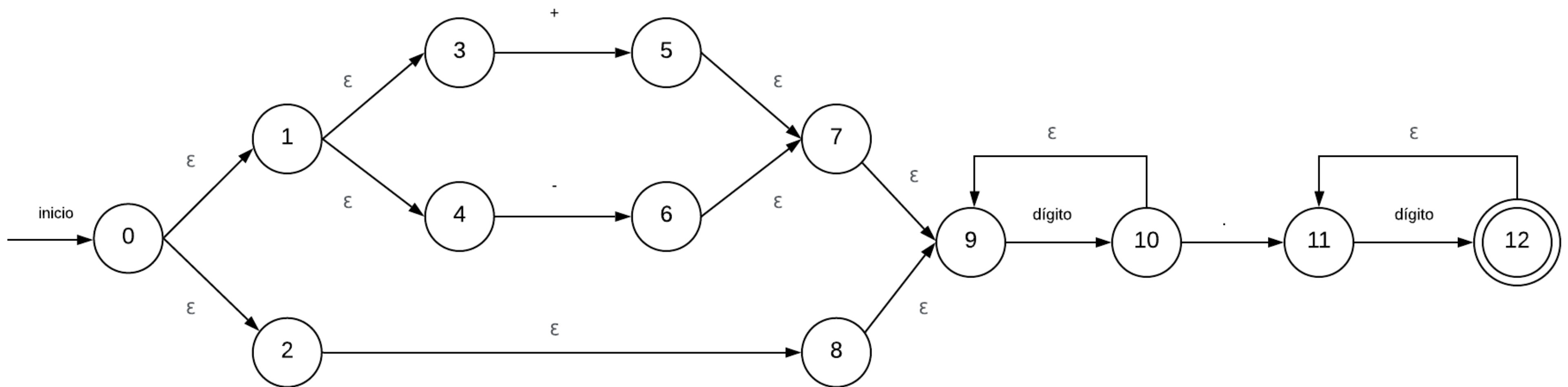


Autómata Real

Expresión Regular: $(+|-|\epsilon)\text{digito}^+.\text{digito}^+$

digito - \rightarrow [0-9]

AFN



$$cerradura\mathcal{E}(S_0) = cerradura\mathcal{E}(0) = \{0,1,2,3,4,8,9\} = A$$

$$u = cerradura\mathcal{E}(mueve(A, +)) = cerradura\mathcal{E}(\{5\}) = \{5,7,9\} = B$$

$$u = cerradura\mathcal{E}(mueve(A, -)) = cerradura\mathcal{E}(\{6\}) = \{6,7,9\} = C$$

$$u = cerradura\mathcal{E}(mueve(A, .)) = - - -$$

$$u = cerradura\mathcal{E}(mueve(A, digito)) = cerradura\mathcal{E}(\{10\}) = \{9,10\} = D$$

$$u = cerradura\mathcal{E}(mueve(B, +)) = - - -$$

$$u = cerradura\mathcal{E}(mueve(B, -)) = - - -$$

$$u = cerradura\mathcal{E}(mueve(B, .)) = - - -$$

$$u = cerradura\mathcal{E}(mueve(B, digito)) = cerradura\mathcal{E}(\{10\}) = \{9,10\} = D$$

$$u = cerradura\mathcal{E}(mueve(C, +)) = - - -$$

$$u = cerradura\mathcal{E}(mueve(C, -)) = - - -$$

$$u = cerradura\mathcal{E}(mueve(C, .)) = - - -$$

$$u = cerradura\mathcal{E}(mueve(C, digito)) = cerradura\mathcal{E}(\{10\}) = \{9,10\} = D$$

$$u = cerradura\mathcal{E}(mueve(D, +)) = - - -$$

$$u = cerradura\mathcal{E}(mueve(D, -)) = - - -$$

$$u = cerradura\mathcal{E}(mueve(D, .)) = cerradura\mathcal{E}(\{11\}) = \{11\} = E$$

$$u = cerradura\mathcal{E}(mueve(D, digito)) = cerradura\mathcal{E}(\{10\}) = \{9,10\} = D$$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(E, +)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(E, -)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(E, .)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(E, \text{dígito})) = \text{cerradura}\mathcal{E}(\{12\}) = \{11, 12\} = F$

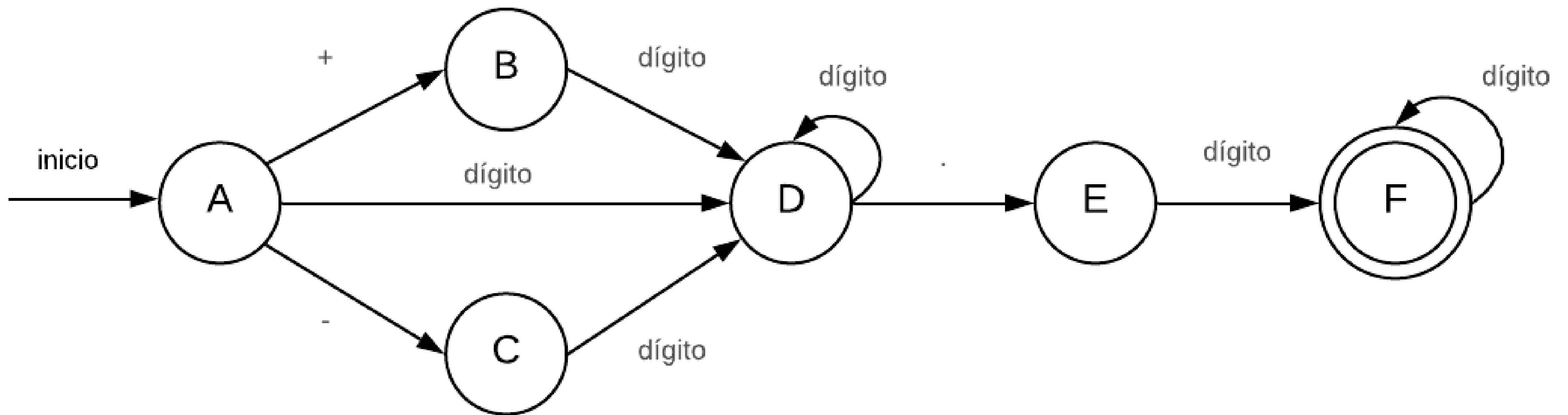
$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, +)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, -)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, .)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, \text{dígito})) = \text{cerradura}\mathcal{E}(\{12\}) = \{11, 12\} = F$

AFD

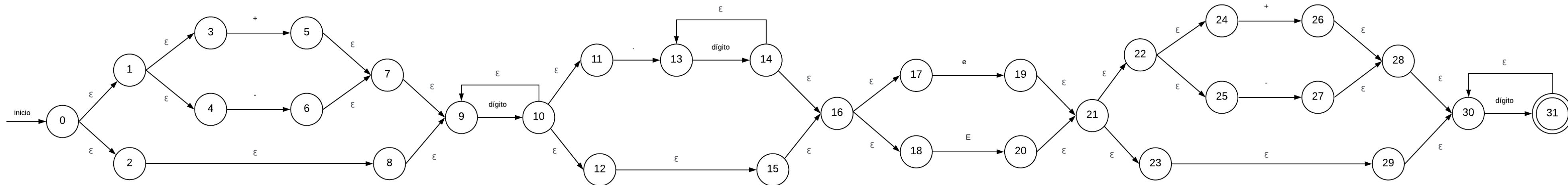


Autómata Notación Científica

Expresión Regular: $(+|-|\epsilon)\text{digito}^+(\text{.digito}^+|\epsilon)(e|E)(+|-|\epsilon)(\text{digito}^+)$

digito - > [0-9]

AFN



$$\text{cerradura}_\epsilon(S_0) = \text{cerradura}_\epsilon(0) = \{0,1,2,3,4,8,9\} = A$$

$$u = \text{cerradura}_\epsilon(\text{mueve}(A, +)) = \text{cerradura}_\epsilon(\{5\}) = \{5,7,9\} = B$$

$$u = \text{cerradura}_\epsilon(\text{mueve}(A, -)) = \text{cerradura}_\epsilon(\{6\}) = \{6,7,9\} = C$$

$$u = \text{cerradura}_\epsilon(\text{mueve}(A, .)) = \text{---}$$

$$u = \text{cerradura}_\epsilon(\text{mueve}(A, e)) = \text{---}$$

$$u = \text{cerradura}_\epsilon(\text{mueve}(A, E)) = \text{---}$$

$$u = \text{cerradura}_\epsilon(\text{mueve}(A, \text{digito})) = \text{cerradura}_\epsilon(\{10\}) = \{9,10,11,12,15,16,17,18\} = D$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, +)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, -)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, e)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, E)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, \text{digito})) = \text{cerradura}\mathcal{E}(\{10\}) = \{9,10,11,12,15,16,17,18\} = D$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, +)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, -)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, e)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, E)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, \text{digito})) = \text{cerradura}\mathcal{E}(\{10\}) = \{9,10,11,12,15,16,17,18\} = D$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, +)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, -)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, .)) = \text{cerradura}\mathcal{E}(\{13\}) = \{13\} = F$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, e)) = \text{cerradura}\mathcal{E}(\{19\}) = \{19,21,22,23,24,25,29,30\} = G$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, E)) = \text{cerradura}\mathcal{E}(\{20\}) = \{20,21,22,23,24,25,29,30\} = H$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, \text{digito})) = \text{cerradura}\mathcal{E}(\{10\}) = \{9,10,11,12,15,16,17,18\} = D$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, +)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, -)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, e)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, E)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, \text{digito})) = \text{cerradura}\mathcal{E}(\{14\}) = \{13, 14, 16, 17, 18\} = I$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, +)) = \text{cerradura}\mathcal{E}(\{26\}) = \{26, 28, 30\} = J$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, -)) = \text{cerradura}\mathcal{E}(\{27\}) = \{27, 28, 30\} = K$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, e)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, E)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, \text{digito})) = \text{cerradura}\mathcal{E}(\{31\}) = \{30, 31\} = L$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, +)) = \text{cerradura}\mathcal{E}(\{26\}) = \{26, 28, 30\} = J$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, -)) = \text{cerradura}\mathcal{E}(\{27\}) = \{27, 28, 30\} = K$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, e)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, E)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, \text{digito})) = \text{cerradura}\mathcal{E}(\{31\}) = \{30, 31\} = L$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, +)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, -)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, e)) = \text{cerradura}\mathcal{E}(\{19\}) = \{19, 21, 22, 23, 24, 25, 29, 30\} = G$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, E)) = \text{cerradura}\mathcal{E}(\{20\}) = \{20, 21, 22, 23, 24, 25, 29, 30\} = H$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, \text{digito})) = \text{cerradura}\mathcal{E}(\{14\}) = \{13, 14, 16, 17, 18\} = I$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, +)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, -)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, e)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, E)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, \text{digito})) = \text{cerradura}\mathcal{E}(\{31\}) = \{30, 31\} = L$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, +)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, -)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, e)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, E)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, \text{digito})) = \text{cerradura}\mathcal{E}(\{31\}) = \{30, 31\} = L$$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, +)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, -)) = - - - -$

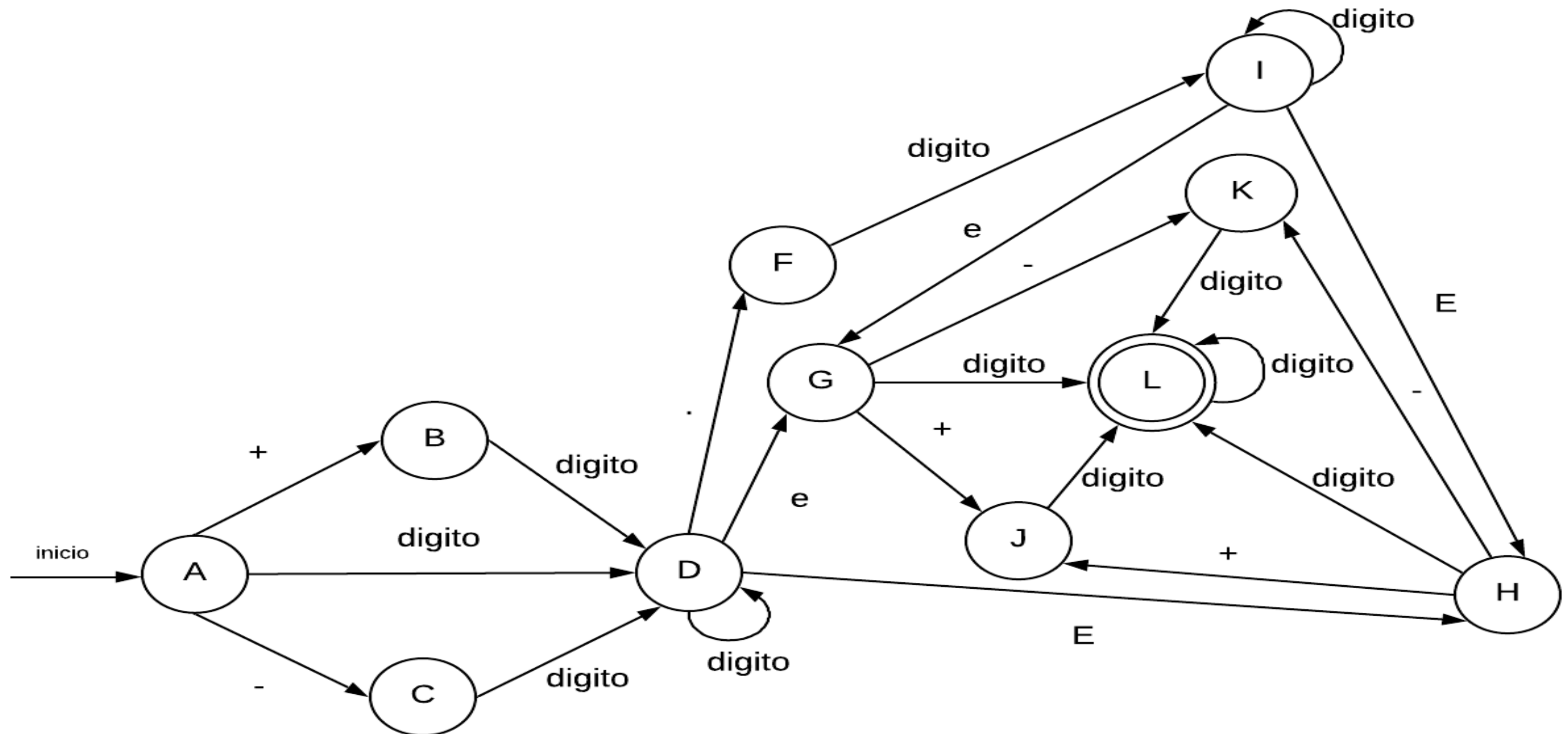
$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, .)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, e)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, E)) = - - - -$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, \text{digito})) = \text{cerradura}\mathcal{E}(\{31\}) = \{30, 31\} = L$

AFD



Autómata Email

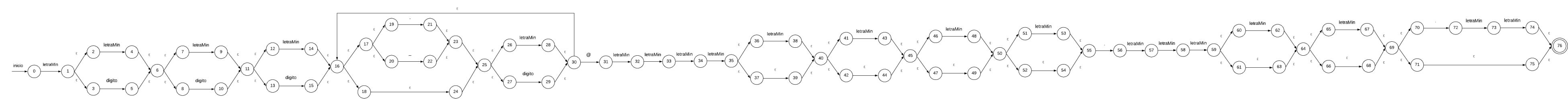
Expresión Regular:

letraMin(letraMin|digito){3}((.|_|ε)(letraMin|digito))+@letraMin{4,8}(.letraMin{3,5}(.letraMin{2}|ε))

digito - > [0-9]

letraMin - > [a-z]

AFN



$$cerradura_{\epsilon}(S_0) = cerradura_{\epsilon}(0) = \{0\} = A$$

$$u = cerradura_{\epsilon}(mueve(A, letraMin)) = cerradura_{\epsilon}(\{1\}) = \{1,2,3\} = B$$

$$u = cerradura_{\epsilon}(mueve(A, digito)) = \dots$$

$$u = cerradura_{\epsilon}(mueve(A, .)) = \dots$$

$$u = cerradura_{\epsilon}(mueve(A, _)) = \dots$$

$$u = cerradura_{\epsilon}(mueve(A, @)) = \dots$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{4\}) = \{4,6,7,8\} = C$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, \text{digito})) = \text{cerradura}\mathcal{E}(\{5\}) = \{5,6,7,8\} = D$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, .)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, _)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B, @)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{9\}) = \{9,11,12,13\} = E$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, \text{digito})) = \text{cerradura}\mathcal{E}(\{10\}) = \{10,11,12,13\} = F$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, .)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, _)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C, @)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{9\}) = \{9,11,12,13\} = E$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, \text{digito})) = \text{cerradura}\mathcal{E}(\{10\}) = \{10,11,12,13\} = F$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, .)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, _)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(D, @)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(E, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{14\}) = \{14,16,17,18,19,20,24,25,26,27\} = G$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(E, \text{digito})) = \text{cerradura}\mathcal{E}(\{15\}) = \{15,16,17,18,19,20,24,25,26,27\} = H$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(E, .)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(E, _)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(E, @)) = ---$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{14\}) = \{14, 16, 17, 18, 19, 20, 24, 25, 26, 27\} = G$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, \text{digito})) = \text{cerradura}\mathcal{E}(\{15\}) = \{15, 16, 17, 18, 19, 20, 24, 25, 26, 27\} = H$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, \cdot)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(F, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{28\}) = \{16, 17, 18, 19, 20, 24, 25, 26, 27, 28, 30\} = I$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, \text{digito})) = \text{cerradura}\mathcal{E}(\{29\}) = \{16, 17, 18, 19, 20, 24, 25, 26, 27, 29, 30\} = J$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, \cdot)) = \text{cerradura}\mathcal{E}(\{21\}) = \{21, 23, 25, 26, 27\} = K$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, _)) = \text{cerradura}\mathcal{E}(\{22\}) = \{22, 23, 25, 26, 27\} = L$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(G, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{28\}) = \{16, 17, 18, 19, 20, 24, 25, 26, 27, 28, 30\} = I$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, \text{digito})) = \text{cerradura}\mathcal{E}(\{29\}) = \{16, 17, 18, 19, 20, 24, 25, 26, 27, 29, 30\} = J$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, \cdot)) = \text{cerradura}\mathcal{E}(\{21\}) = \{21, 23, 25, 26, 27\} = K$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, _)) = \text{cerradura}\mathcal{E}(\{22\}) = \{22, 23, 25, 26, 27\} = L$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(H, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{28\}) = \{16, 17, 18, 19, 20, 24, 25, 26, 27, 28, 30\} = I$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, \text{digito})) = \text{cerradura}\mathcal{E}(\{29\}) = \{16, 17, 18, 19, 20, 24, 25, 26, 27, 29, 30\} = J$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, \cdot)) = \text{cerradura}\mathcal{E}(\{21\}) = \{21, 23, 25, 26, 27\} = K$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, _)) = \text{cerradura}\mathcal{E}(\{22\}) = \{22, 23, 25, 26, 27\} = L$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(I, @)) = \text{cerradura}\mathcal{E}(\{31\}) = \{31\} = M$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{28\}) = \{16,17,18,19,20,24,25,26,27,28,30\} = I$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, \text{digito})) = \text{cerradura}\mathcal{E}(\{29\}) = \{16,17,18,19,20,24,25,26,27,29,30\} = J$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, .)) = \text{cerradura}\mathcal{E}(\{21\}) = \{21,23,25,26,27\} = K$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, _)) = \text{cerradura}\mathcal{E}(\{22\}) = \{22,23,25,26,27\} = L$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(J, @)) = \text{cerradura}\mathcal{E}(\{31\}) = \{31\} = M$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{28\}) = \{16,17,18,19,20,24,25,26,27,28,30\} = I$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, \text{digito})) = \text{cerradura}\mathcal{E}(\{29\}) = \{16,17,18,19,20,24,25,26,27,29,30\} = J$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(K, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{28\}) = \{16,17,18,19,20,24,25,26,27,28,30\} = I$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, \text{digito})) = \text{cerradura}\mathcal{E}(\{29\}) = \{16,17,18,19,20,24,25,26,27,29,30\} = J$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(L, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(M, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{32\}) = \{32\} = N$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(M, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(M, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(M, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(M, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(N, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{33\}) = \{33\} = O$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(N, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(N, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(N, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(N, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(O, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{34\}) = \{34\} = P$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(O, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(O, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(O, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(O, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(P, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{35\}) = \{35, 36, 37, 39, 40, 41, 42, 44, 45, 46, 47, 49, 50, 51, 52, 54, 55\} = Q$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(P, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(P, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(P, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(P, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Q, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{38, 43, 48, 53\}) = \{38, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55\} = R$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Q, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Q, .)) = \text{cerradura}\mathcal{E}(\{56\}) = \{56\} = S$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Q, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Q, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(R, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{43,48,53\}) = \{43,45,46,47,48,49,50,51,52,53,54,55\} = T$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(R, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(R, .)) = \text{cerradura}\mathcal{E}(\{56\}) = \{56\} = S$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(R, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(R, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(S, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{57\}) = \{57\} = U$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(S, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(S, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(S, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(S, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(T, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{48,53\}) = \{48,50,51,52,53,54,55\} = V$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(T, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(T, .)) = \text{cerradura}\mathcal{E}(\{56\}) = \{56\} = S$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(T, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(T, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(U, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{58\}) = \{58\} = W$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(U, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(U, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(U, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(U, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(V, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{53\}) = \{53, 55\} = X$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(V, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(V, .)) = \text{cerradura}\mathcal{E}(\{56\}) = \{56\} = S$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(V, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(V, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(W, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{59\}) = \{59, 60, 61, 63, 64, 65, 66, 68, 69, 70, 71, 75, 76\} = Y$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(W, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(W, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(W, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(W, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(X, \text{letraMin})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(X, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(X, .)) = \text{cerradura}\mathcal{E}(\{56\}) = \{56\} = S$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(X, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(X, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Y, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{62, 67\}) = \{62, 64, 65, 66, 67, 68, 69, 70, 71, 75, 76\} = Z$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Y, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Y, .)) = \text{cerradura}\mathcal{E}(\{72\}) = \{72\} = A1$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Y, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Y, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Z, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{67\}) = \{67, 69, 70, 71, 75, 76\} = B1$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Z, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Z, .)) = \text{cerradura}\mathcal{E}(\{72\}) = \{72\} = A1$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Z, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(Z, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(A1, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{73\}) = \{73\} = C1$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(A1, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(A1, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(A1, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(A1, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B1, \text{letraMin})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B1, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B1, .)) = \text{cerradura}\mathcal{E}(\{72\}) = \{72\} = A1$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B1, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(B1, @)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C1, \text{letraMin})) = \text{cerradura}\mathcal{E}(\{74\}) = \{74, 76\} = D1$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C1, \text{digito})) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C1, .)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C1, _)) = - - -$$

$$u = \text{cerradura}\mathcal{E}(\text{mueve}(C1, @)) = - - -$$

$u = \text{cerradura}\mathcal{E}(\text{mueve}(D1, \text{letraMin})) = - - -$
 $u = \text{cerradura}\mathcal{E}(\text{mueve}(D1, \text{digito})) = - - -$
 $u = \text{cerradura}\mathcal{E}(\text{mueve}(D1, .)) = - - -$
 $u = \text{cerradura}\mathcal{E}(\text{mueve}(D1, _)) = - - -$
 $u = \text{cerradura}\mathcal{E}(\text{mueve}(D1, @)) = - - -$

AFD

