Exercici 1

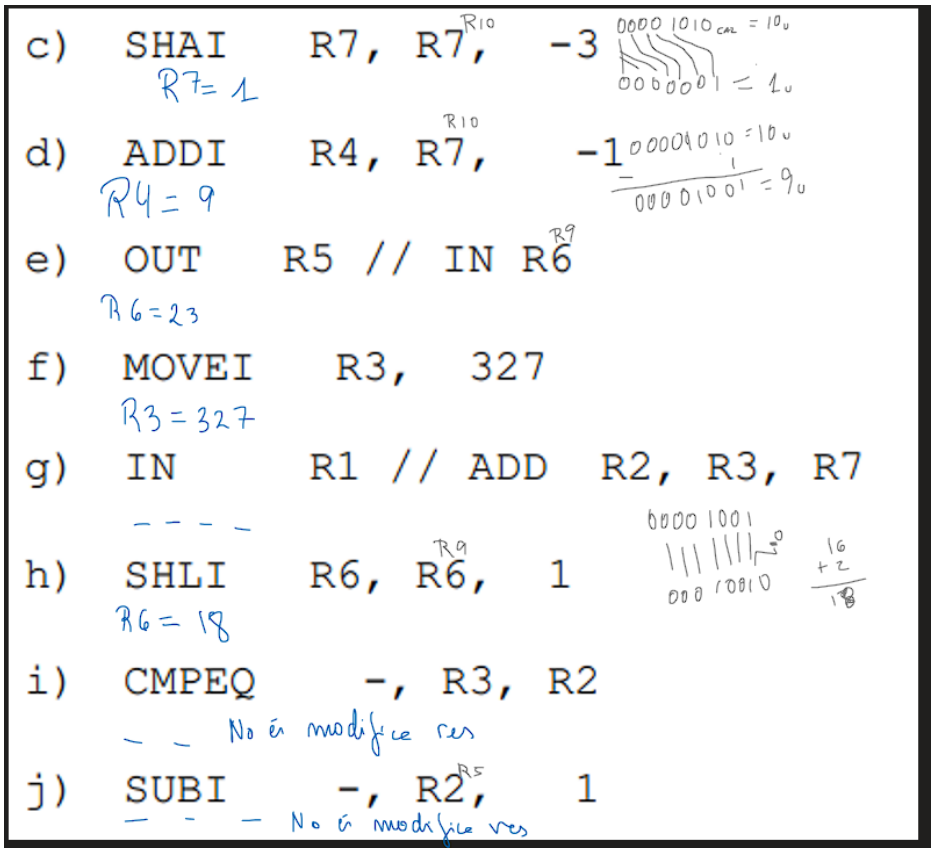
(1) No es pot pq. IN R1 requereix de @D=001 mentre que ADD R2, R3, R7 necessita @D=010. Com que hi ha col·lisió, no es pot realitzar l'ordre.

	@A			@B			Rb/N	OP		F			In/Alu	@D			WrD	N (Hexa)			
	b_2	b_1	b_0	b_2	b_1	b_0		b_1	b_0	b_2	b_1	b_0		b_2	b_1	b_0		D_3	D_2	D_1	D_0
AND R3, R1, R5	0	0	1	1	0	1	1	0	0	0	0	0	0	0	1	1	1	X	X	X	X
ADD R1, R2, R3 // NOT R2, R1	—																				
SHAI R7, R7, -3	1	1	1	X	X	X	0	0	0	1	1	0	0	1	1	1	1	F	F	F	D
ADDI R4, R7, -1	1	1	1	X	X	X	0	0	0	1	0	0	0	1	0	0	1	F	F	F	F
OUT R5 // IN R6	1	0	1	X	X	X	X	X	X	X	X	X	1	1	1	0	1	X	X	X	X
IN R1 // ADD R2, R3, R7	(1)																				
MOVEI R3, 327	X	X	X	X	X	X	0	1	0	0	0	1	0	0	1	1	1	0	1	4	7
SHLI R6, R6, 1	1	1	0	X	X	X	0	0	0	1	1	1	0	1	1	0	1	0	0	0	1
CMPEQ -, R3, R2	0	1	1	0	1	0	1	0	1	0	1	1	X	X	X	X	0	X	X	X	X
SUBI -, R2, 1	0	1	0	X	X	X	0	0	0	1	0	1	X	X	X	X	0	0	0	0	1

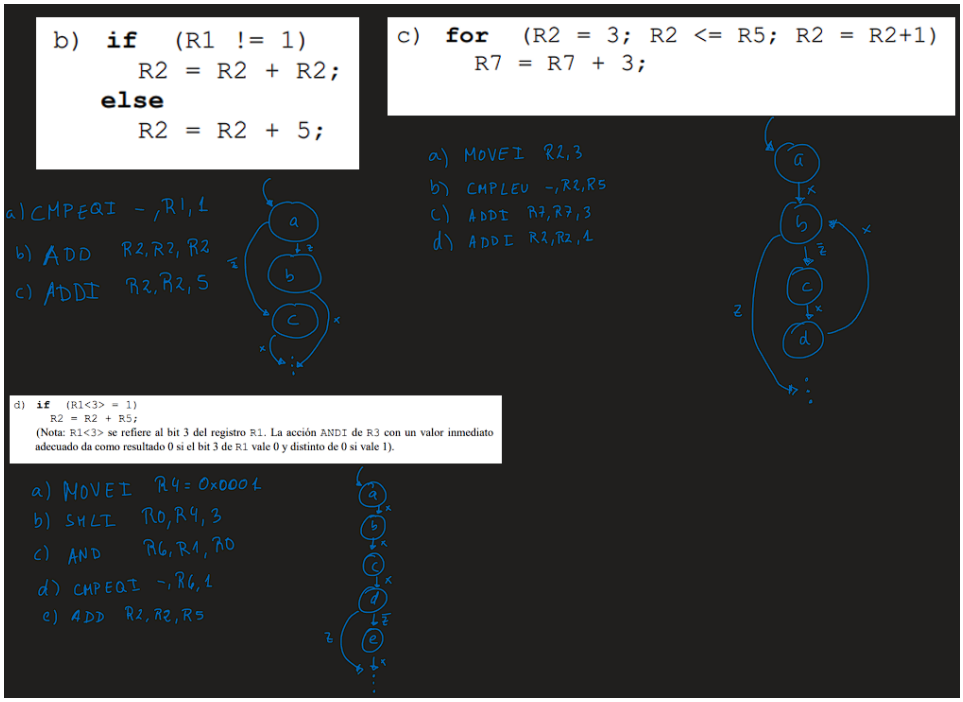
Exercici 2

Mnemotécnico	Palabra de control hexadecimal
AND R3, R1, R5	06C070000
ADD R1, R2, R3 // NOT R2, R1	----------
SHAI R7, R7, -3	1C0CFFFFD
ADDI R4, R7, -1	1C089FFFF
OUT R5 // IN R6	1401D0000
IN R1 // ADD R2, R3, R7	- - - - - - - - -
MOVEI R3, 327	002270147
SHLI R6, R6, 1	180ED0001
CMPEQ -, R3, R2	0D5600000
SUBI -, R2, 1	086A00001

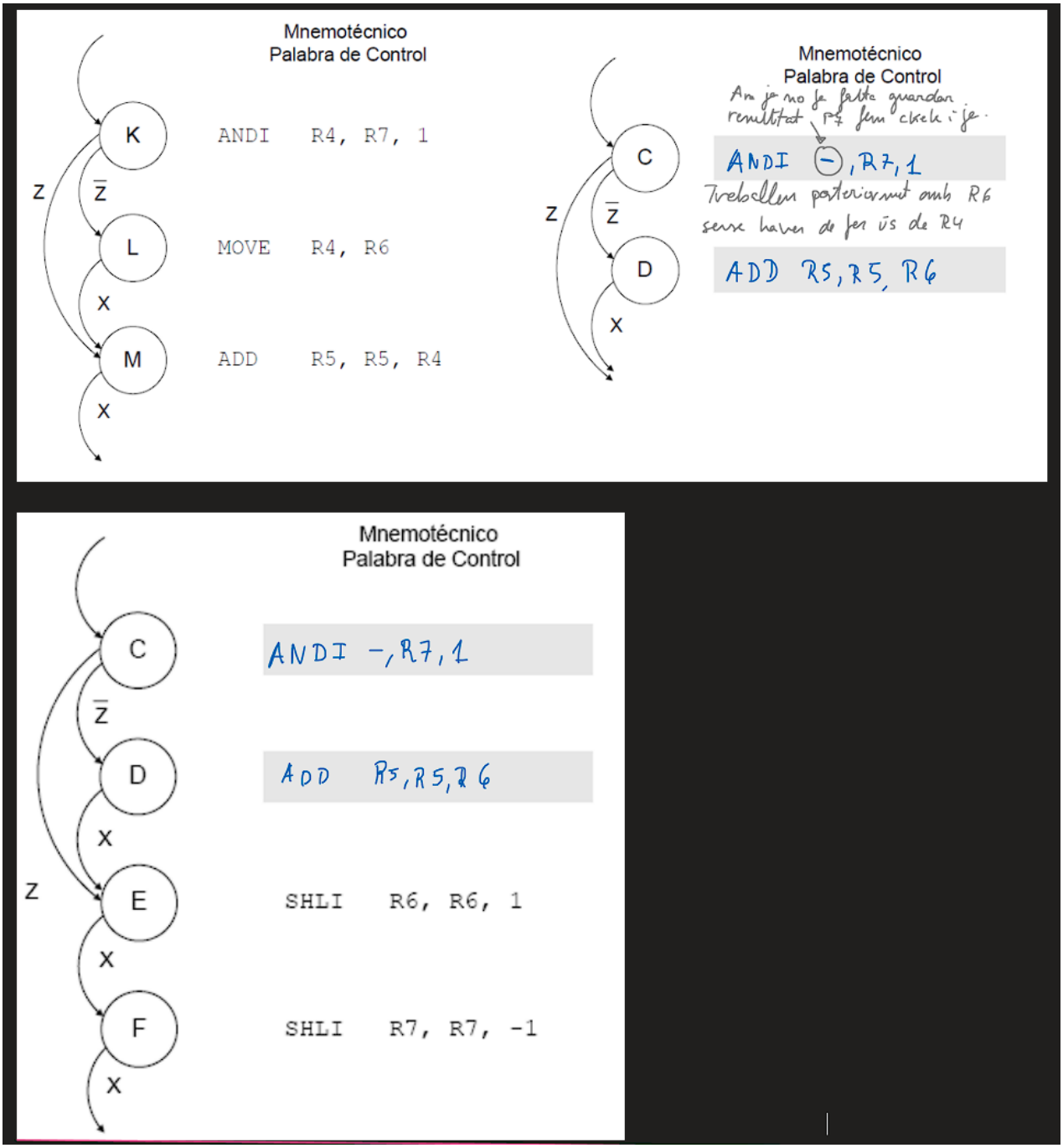
Exercici 3



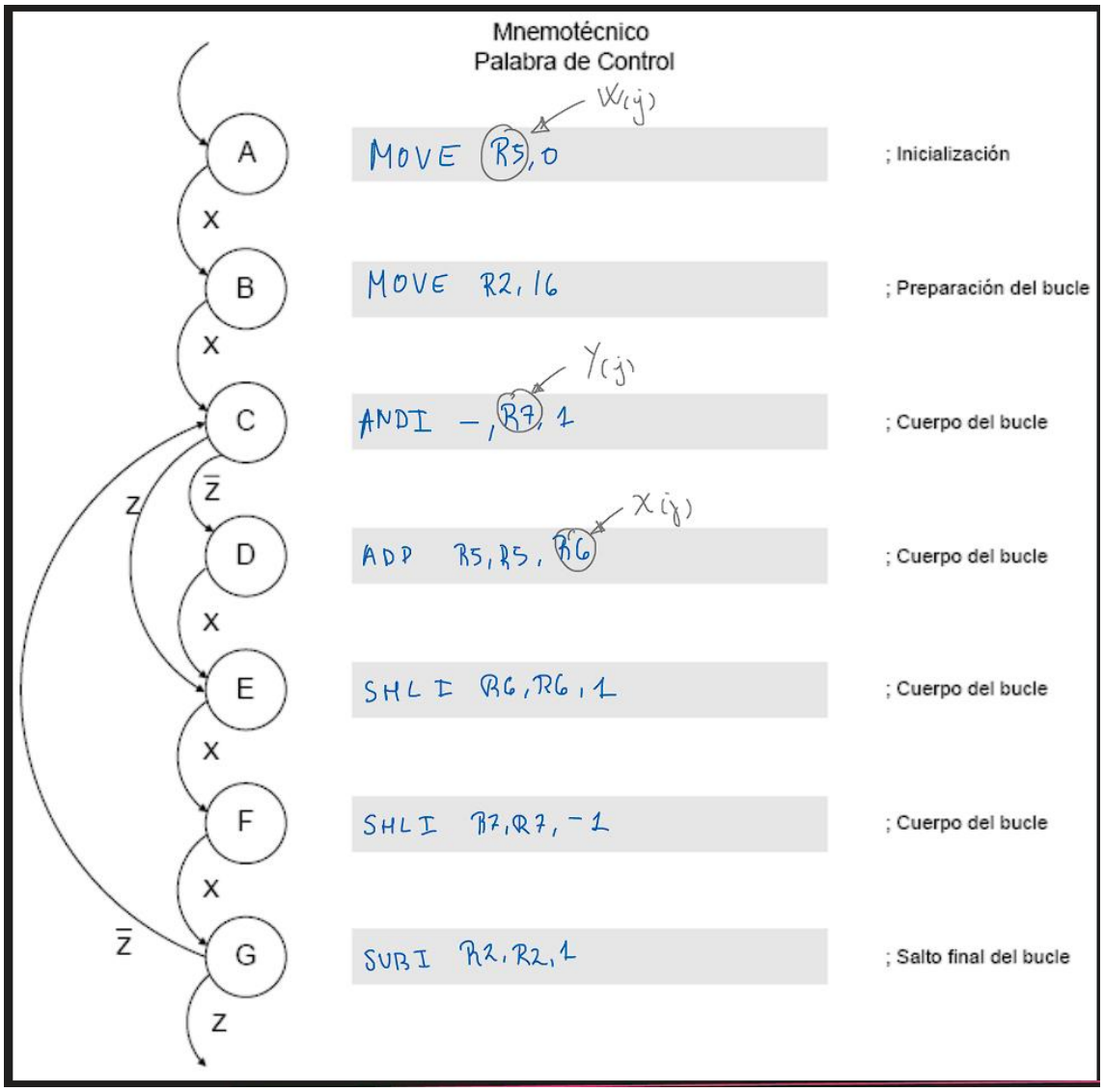
Exercici 4



Exercici 5


Mnemotécnico
Palabra de Control
K
L
M
Z
$\bar{Z}$
X
X
ANDI R4, R7, 1
MOVE R4, R6
ADD R5, R5, R4
Mnemotécnico
Palabra de Control
Am ja no fa falta guardar resultat R4 fem cicle i je.
C
D
Z
$\bar{Z}$
X
ANDI -, R7, 1
Treballem posteriorment amb R6 sense haver de fer ús de R4
ADD R5, R5, R6
Mnemotécnico
Palabra de Control
C
D
E
F
Z
$\bar{Z}$
X
X
X
ANDI -, R7, 1
ADD R5, R5, R6
SHLI R6, R6, 1
SHLI R7, R7, -1

Exercici 6


Mnemotécnico
Palabra de Control
A
B
C
D
E
F
G
X
X
X
X
X
X
Z̄
Z
Z̄
Z
MOVE R5, 0
MOVE R2, 16
ANDI _, R7, 1
ADD R5, R5, R6
SHLI R6, R6, 1
SHLI R7, R7, -1
SUBI R2, R2, 1
; Inicialización
; Preparación del bucle
; Cuerpo del bucle
; Cuerpo del bucle
; Cuerpo del bucle
; Cuerpo del bucle
; Salto final del bucle

Exercici 7

Ciclo	Mnemotécnico	Estado actual de los registros			
		R2	R5	R6	R7
0	MOVEI R5, 0	XXXX	XXXX	0011	0101
1	MOVEI R2, 4		0000		
2	ANDI -, R7, 1	0100			
3	ADD R5, R5, R6				
4	SHLI R6, R6, 1		0011		
5	SHLI R7, R7, -1			0110	
6	SUBI R2, R2, 1				0010
7	ANDI -, R7, 1	0011			
8	SHLI R6, R6, 1				
9	SHLI R7, R7, -1			1100	
10	SUBI R2, R2, 1				0001
11	ANDI -, R7, 1	0010			
12	ADD R5, R5, R6				
13	SHLI R6, R6, 1		1111		
14	SHLI R7, R7, -1			1000	
15	SUBI R2, R2, 1				0000
16	ANDI -, R7, 1	0001			
17	SHLI R6, R6, 1				
18	SHLI R7, R7, -1			0000	
19	SUBI R2, R2, 1				0000

Tarda 20 cicles en completar tot (0 → 19) on R2 al següent ja és '0'.

Els reg. de 6 UPG són R2, R5, R6 i R7.

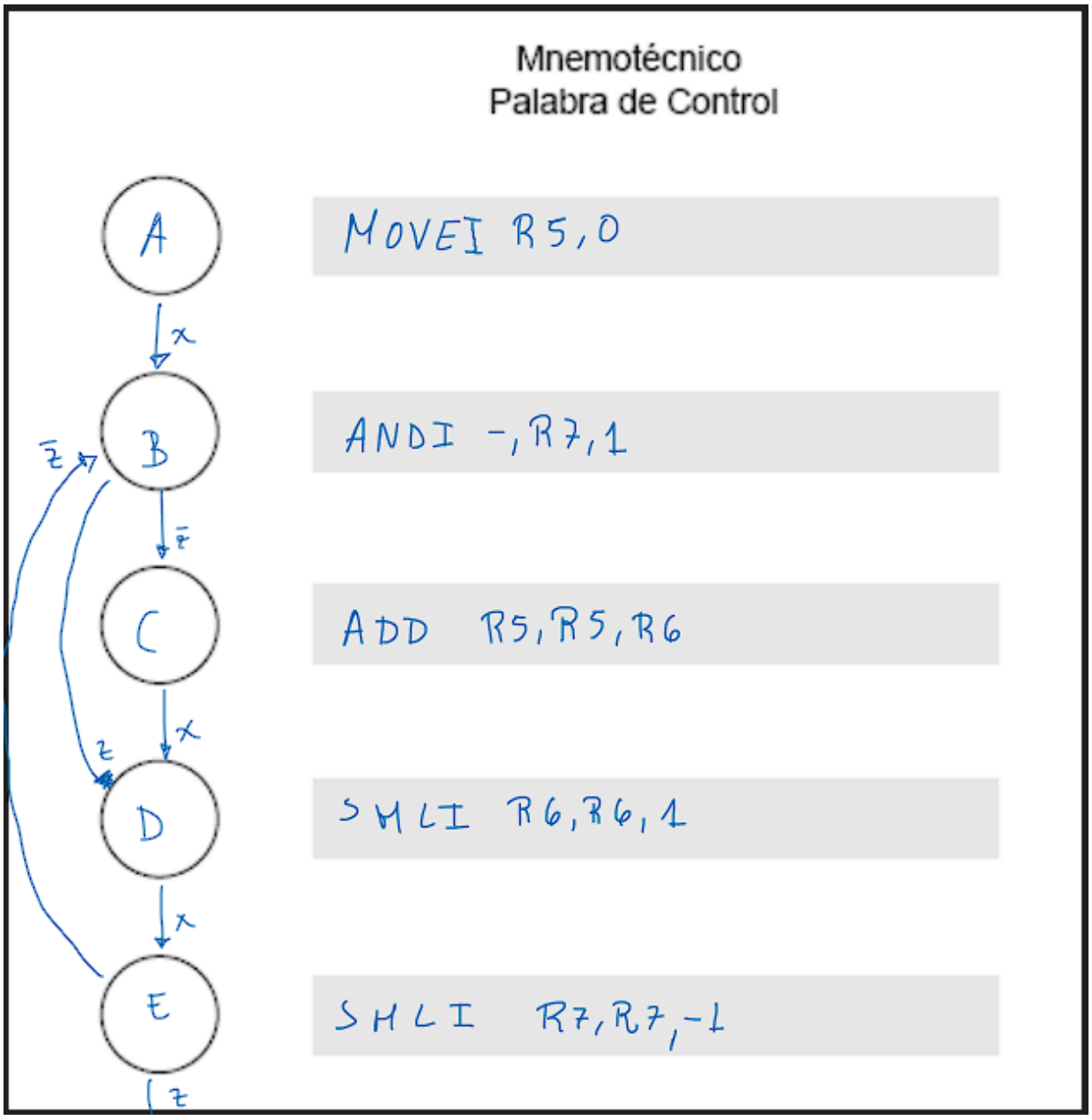
R5 = 1111 ← Resultat

R2 = 0000 ← Contador i és '0000' pq al cicle 19 fem 6 vegades tot i que no vaguem resultat.

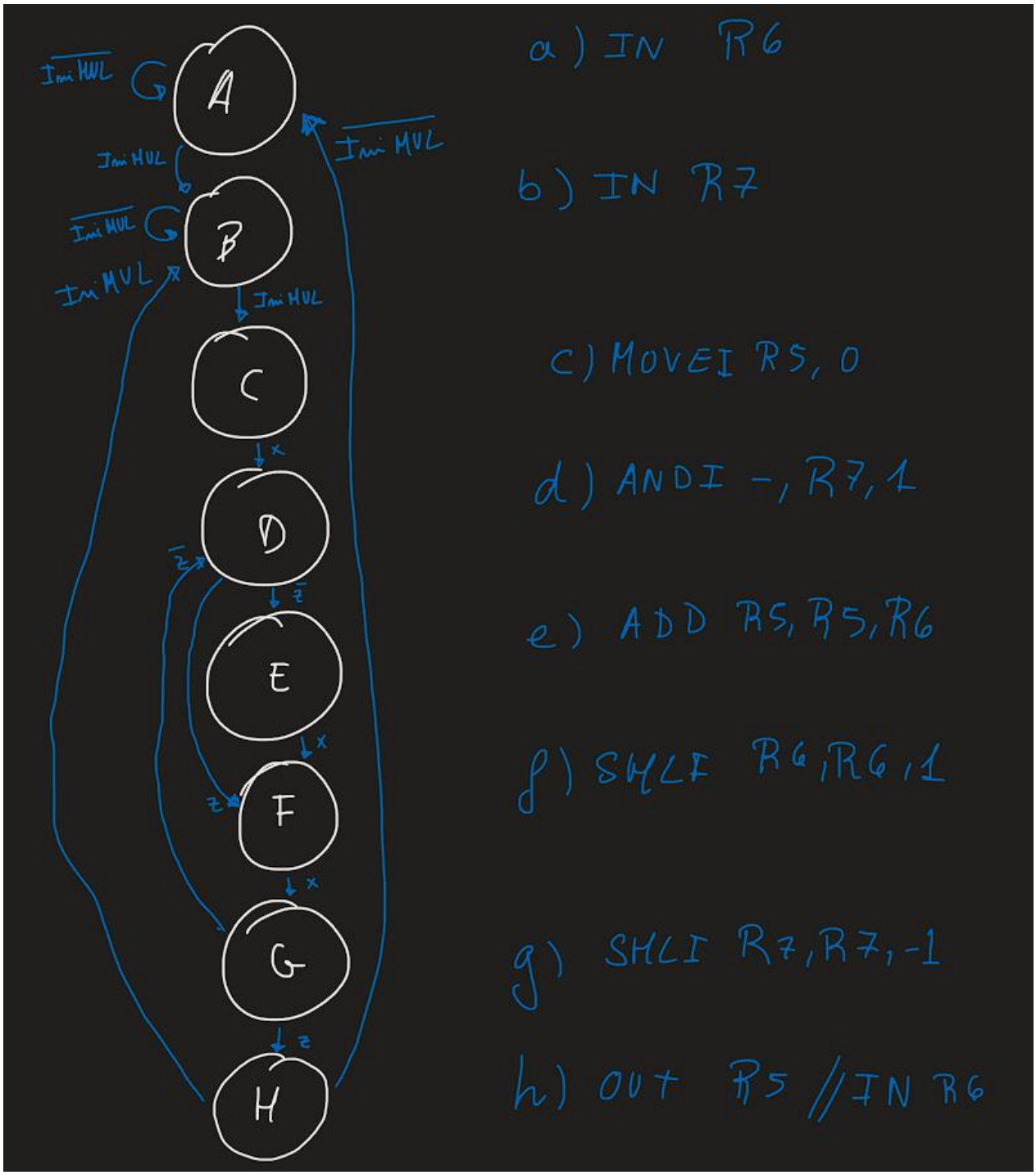
R6 = 0000 ← Previant era el '3'

R7 = 0000 ← Previant era el '5'.

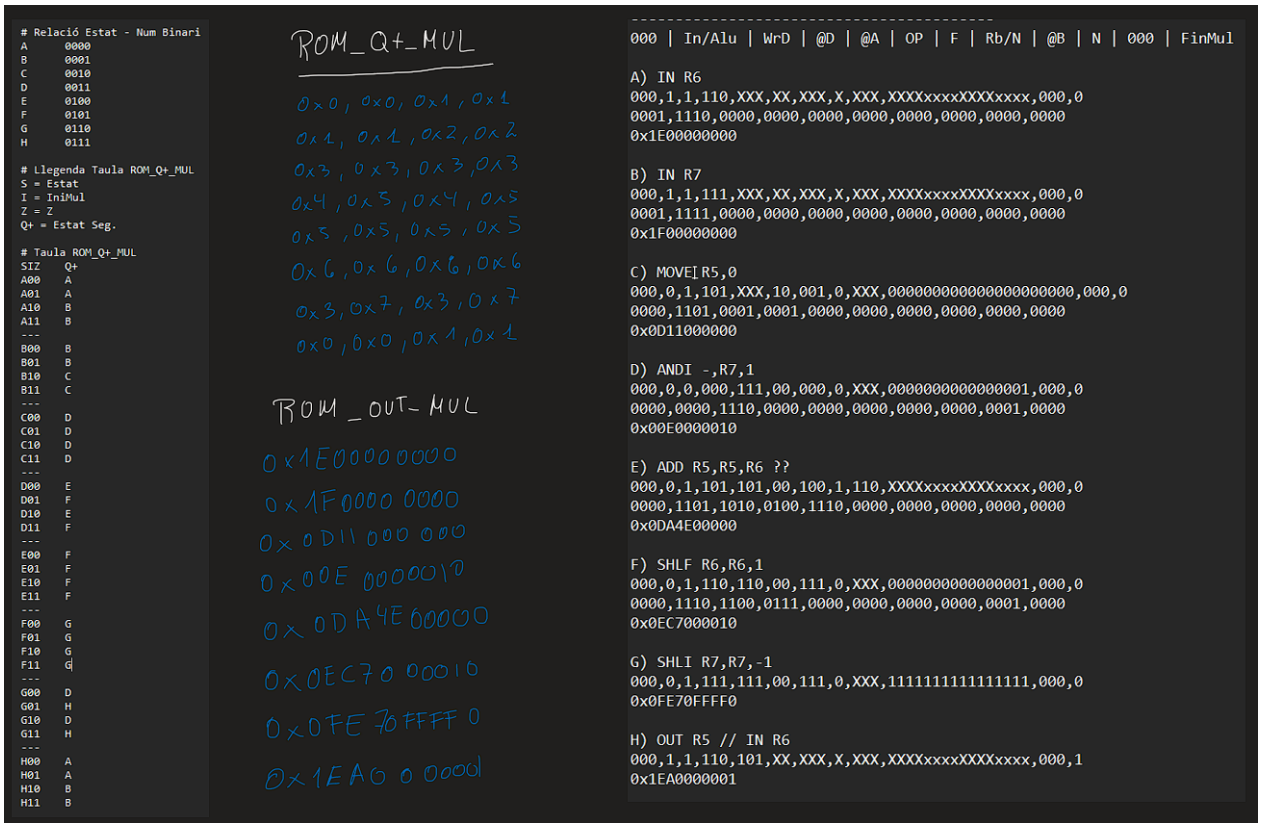
Exercici 8


Mnemotécnico
Palabra de Control
A
B
C
D
E
x
z̄
z
MOVEI R5,0
ANDI -,R7,1
ADD R5,R5,R6
SHLI R6,R6,1
SHLI R7,R7,-1

Exercici 9


A
B
C
D
E
F
G
H
Imi MUL
a) IN R6
b) IN R7
c) MOVEI R5, 0
d) ANDI -, R7, 1
e) ADD R5, R5, R6
f) SHLI R6, R6, 1
g) SHLI R7, R7, -1
h) OUT R5 // IN R6

Exercici 10



```
# Relació Estat - Num Binari
A       0000
B       0001
C       0010
D       0011
E       0100
F       0101
G       0110
H       0111

# Llegenda Taula ROM_Q+_MUL
S = Estat
I = IniMul
Z = Z
Q+ = Estat Seg.

# Taula ROM_Q+_MUL
SIZ    Q+
A00    A
A01    A
A10    B
A11    B
---
B00    B
B01    B
B10    C
B11    C
---
C00    D
C01    D
C10    D
C11    D
---
D00    E
D01    F
D10    E
D11    F
---
E00    F
E01    F
E10    F
E11    F
---
F00    G
F01    G
F10    G
F11    G
---
G00    D
G01    H
G10    D
G11    H
---
H00    A
H01    A
H10    B
H11    B
```

ROM_Q+_MUL

0x0, 0x0, 0x1, 0x1
0x1, 0x1, 0x2, 0x2
0x3, 0x3, 0x3, 0x3
0x4, 0x5, 0x4, 0x5
0x5, 0x5, 0x5, 0x5
0x6, 0x6, 0x6, 0x6
0x3, 0x7, 0x3, 0x7
0x0, 0x0, 0x1, 0x1

ROM_OUT_MUL

0x1E00000000
0x1F0000 0000
0x0D11 000 000
0x00E 0000010
0x0DA4E00000
0x0EC70 00010
0x0FE 70FFFF 0
0x1EA0 0 00001

```
-----------------------------------------
000 | In/Alu | WrD | @D | @A | OP | F | Rb/N | @B | N | 000 | FinMul

A) IN R6
000,1,1,110,XXX,XX,XXX,X,XXX,XXXXxxxxXXXXxxxx,000,0
0001,1110,0000,0000,0000,0000,0000,0000,0000,0000
0x1E00000000

B) IN R7
000,1,1,111,XXX,XX,XXX,X,XXX,XXXXxxxxXXXXxxxx,000,0
0001,1111,0000,0000,0000,0000,0000,0000,0000,0000
0x1F00000000

C) MOVE R5,0
000,0,1,101,XXX,10,001,0,XXX,00000000000000000000,000,0
0000,1101,0001,0001,0000,0000,0000,0000,0000,0000
0x0D11000000

D) ANDI -,R7,1
000,0,0,000,111,00,000,0,XXX,0000000000000001,000,0
0000,0000,1110,0000,0000,0000,0000,0000,0001,0000
0x00E0000010

E) ADD R5,R5,R6 ??
000,0,1,101,101,00,100,1,110,XXXXxxxxXXXXxxxx,000,0
0000,1101,1010,0100,1110,0000,0000,0000,0000,0000
0x0DA4E00000

F) SHLF R6,R6,1
000,0,1,110,110,00,111,0,XXX,0000000000000001,000,0
0000,1110,1100,0111,0000,0000,0000,0000,0001,0000
0x0EC7000010

G) SHLI R7,R7,-1
000,0,1,111,111,00,111,0,XXX,1111111111111111,000,0
0x0FE70FFFF0

H) OUT R5 // IN R6
000,1,1,110,101,XX,XXX,X,XXX,XXXXxxxxXXXXxxxx,000,1
0x1EA0000001
```