

DETERMINING LOGIC GATES REQUIRED FOR 2-BIT BINARY DIVISION

Quotient

A1	A0	B1	B0	Q1	Q0
0	0	0	0	0 - NA	0 - NA
0	0	0	1	0	0
0	0	1	0	0	0
0	0	1	1	0	0
0	1	0	0	0 - NA	0 - NA
0	1	0	1	0	1
0	1	1	0	0	0
0	1	1	1	0	0
1	0	0	0	0 - NA	0 - NA
1	0	0	1	1	0
1	0	1	0	0	1
1	0	1	1	0	0
1	1	0	0	0 - NA	0 - NA
1	1	0	1	1	1
1	1	1	0	0	1
1	1	1	1	0	1

$$NA = (B1+B0)'$$

$$= (B1 \text{ nor } B0);$$

Q0	B-00	B-01	B-11	B-10
A-00				
A-01		1		
A-11		1	1	1
A-10				1

$$Q0 = (A0.B1'.B0 + A1.A0.B0 + A1.B1.B0')$$

$$= ((A0 \text{ nand } B1' \text{ nand } B0) \text{ nand } (A1 \text{ nand } A0 \text{ nand } B0) \text{ nand } (A1 \text{ nand } B1 \text{ nand } B0'));$$

Q1	B-00	B-01	B-11	B-10
A-00				
A-01				
A-11		1		
A-10		1		

$$Q1 = (A1.B1'.B0)$$

$$= (A1' \text{ nor } B1 \text{ nor } B0');$$

Remainder

A1	A0	B1	B0	R1	R0
0	0	0	0	0 – NA	0 - NA
0	0	0	1	0	0
0	0	1	0	0	0
0	0	1	1	0	0
0	1	0	0	0 – NA	0 - NA
0	1	0	1	0	0
0	1	1	0	0	1
0	1	1	1	0	1
1	0	0	0	0 – NA	0 - NA
1	0	0	1	0	0
1	0	1	0	0	0
1	0	1	1	1	0
1	1	0	0	0 – NA	0 - NA
1	1	0	1	0	0
1	1	1	0	0	1
1	1	1	1	0	0

$$NA = (B1+B0)'$$

$$= (B1 \text{ nor } B0);$$

R0	00	01	11	10
00				
01			1	1
11				1
10				

$$R0 = (A1'.A0.B1 + A0.B1.B0')$$

$$= ((A1' \text{ nand } A0 \text{ nand } B1) \text{ nand } (A0 \text{ nand } B1 \text{ nand } B0'));$$

R1	00	01	11	10
00				
01				
11				
10			1	

$$R1 = (A1.A0'.B1.B0)$$

$$= ((A1 \text{ nand } A0' \text{ nand } B1)' \text{ nor } B0');$$