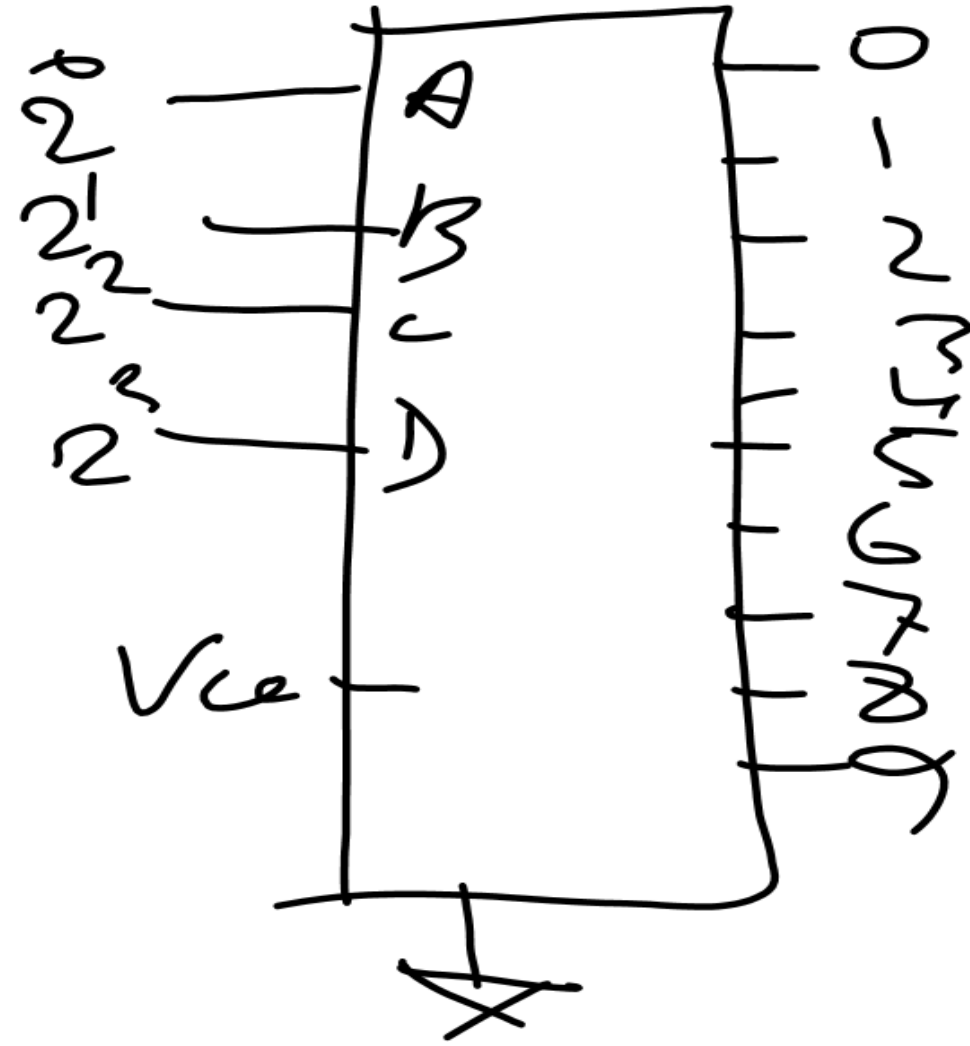


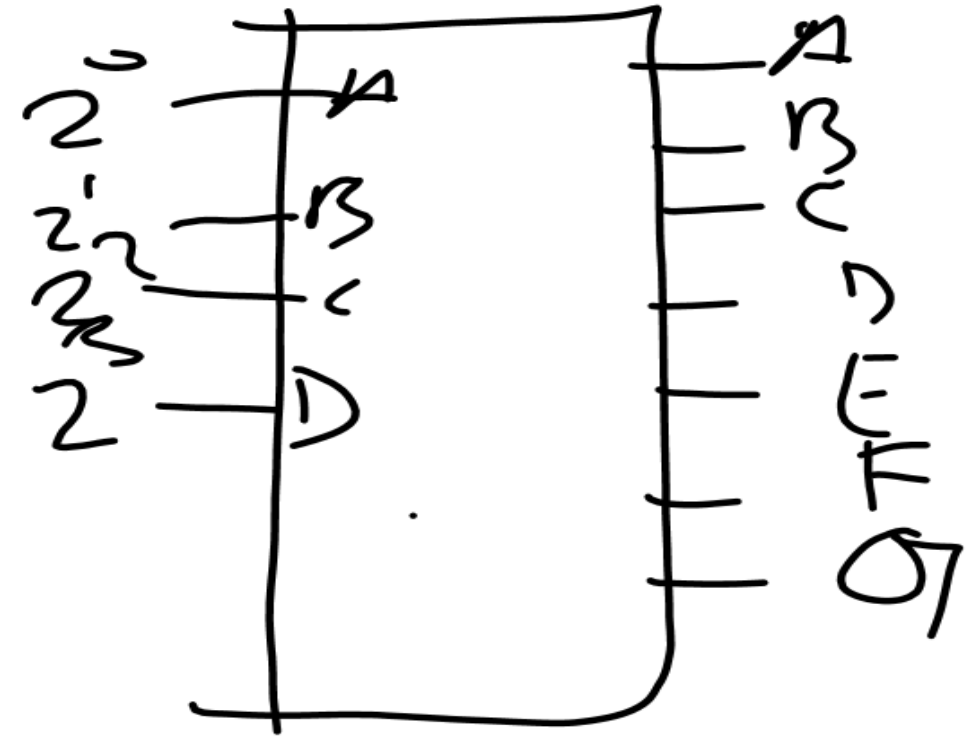
- ① Logic gate
- ② Simplification
- ③ Number System
- ④ K-Map - QM
- ⑤ Addition - Subtraction
- ⑥ MSI Devices
  - Encoder
  - Decoder
  - MUX

7. Combinational
8. Sequential -
  - FF
  - Latch
  - Register
  - Counter
  - Shift
9. Master-Slave  
MS-FF

# BCD — Decimal Decoder



# BCD — 7 Segment Display



$\{0, 1, 2, 4, 6, 8, 9, 11, 13, 15\}$

Group,

Maintenans

Variable

0  
1  
2  
3  
4

0

1  
2

4

6

8

13

0 0 0 0 0

0 0 0 1

0 0 1 0

0 1 0 0

0 1 1 0

1 0 0 0

0 0 1

0 1 1

1 1 1

1 1 1

0

1

1

1

2

1

2

max

G	MT	V
0	0	0 0 0 0
I	1	0 0 0 1
	2	0 0 1 0
	4	0 1 0 0
	8	1 0 0 0
2	6	0 1 1 0
	9	1 0 0 1
3	11	1 0 1 1
	13	1 1 0 1
4	15	1 1 1 1

PI
0.1 - 0 0 0 -
0 0.2 - 0 0 - 0
0.4 - 0 - 0 0
0.8 - 1 0 0 0
1.9 - - 0 0 1
! 2.6 - 0 - 1 0
4.6 - 0 1 - 0
8.9 - 1 0 0 -
2 9.11 - 1 0 - 1
9.13 - 1 - 0 1
11.15 - 1 - 1 1
13.17 - 1 1 - 1

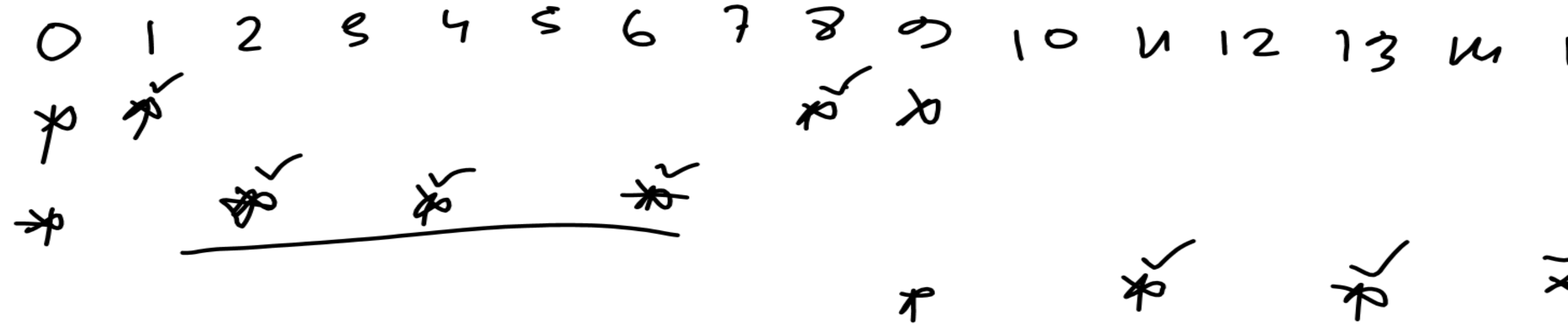
M		✓			
0,1,3,9	—	—	0	0	—
0,2,4,6	—	0	—	—	0
0,4,2,6	—	0	—	—	0
0,8,1,9	—	—	0	0	—
9,11,13,15	—	1	—	—	1
9,13,16,15	—	1	—	—	1

M		<del>A</del>	<del>B</del>	<del>C</del>	<del>D</del>
0,1,3,9	—	0	0	—	—
0,2,4,6	—	0	—	—	0
9,11,13,15	—	1	—	—	1

0,1,3,9	—	$\bar{B}\bar{C}$
0,2,4,6	—	$\bar{A}\bar{D}$
9,11,13,15	—	$\bar{A}D$

$\bar{B}\bar{C}(6,1,8,9)$   
 $\bar{A}\bar{D}(0,2,4,6)$   
 $AD(9,11,13,15)$



$$\bar{B}\bar{C} + \bar{A}\bar{D} + AD$$

1. Minterms — Variable

2. Group — MT —  $\checkmark$

3. Group — Prime Implicant —  $\checkmark$

4. Repeat — 2, 3 until No-change

5. Create table to find essential Prime Impl.

6. Put star for each value

7. Derive - Expression

$$\sum \{0, 2, 3, 5, 8, 14, 17, 23, 29, 31\}$$

$$14 - 01110$$

$$17 - 10001$$

$$23 - 10111$$

$$29 - 11101$$

$$31 - 11111$$