

Solutions

Each answer shows the steps, then the **result**.

2.1

- rows 00, 01, 10 give **1**
- row 11 gives **0**

2.2

- (i) **0**
- (ii) NOT 1 = **0**
- (iii) 0 OR 1 = **1**

2.3

<i>A</i>	<i>B</i>	NOT <i>A</i>	<i>X</i>
0	0	1	0
0	1	1	1
1	0	0	0
1	1	0	0

- NOT *A* column
- *X* is 1 only for *A* = 0, *B* = 1

3.1 C

- NOR: NOT (*A* OR *B*)

3.2 D

- $2^4 = 16$

3.3 B

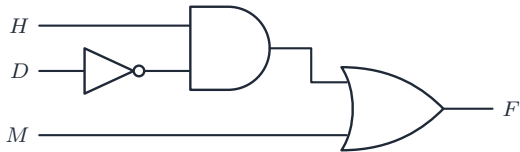
- $Q = 0$ needs $C = 1$, and $P = 0$ needs A AND $B = 0$

3.4

(a)

- $F = (H \text{ AND NOT } D) \text{ OR } M$

(b)



- NOT gate on *D*

- AND gate with inputs *H* and NOT *D*
- OR gate with inputs the AND output and *M*, output *F*

(c)

<i>H</i>	<i>D</i>	<i>M</i>	NOT <i>D</i>	<i>H</i> AND NOT <i>D</i>	<i>F</i>
0	0	0	1	0	0
0	0	1	1	0	1
0	1	0	0	0	0
0	1	1	0	0	1
1	0	0	1	1	1
1	0	1	1	1	1
1	1	0	0	0	0
1	1	1	0	0	1

- 8 rows in binary order
- NOT *D* column
- AND column
- *F* column

(d)

- **5**