

Lecture 6 - Tabulation

Question:

Simplify the function using Tabulation Method:

$$F(w,x,y,z)=\sum(4,1,7,6,9,8,11,15,10)$$

Lecture 6

- ~~Create~~ ☐ Write Binary for all the given numbers.
- ☐ Group the minterms based on no of 1's
- ☐ Group them again based on 1 bit difference.
Write that bit as dash (-).
- ☐ Group them again based on 1 bit difference;
but this time you have to match the dash (-)
position too.
- ☐ This goes on until there is nothing else to
match.
- ☐ Put tick marks as shown in the classroom.
- ☐ Remaining terms [without tick] are prime implicants
- ☐ Write them with variables -
 - $x'y'z \rightarrow _001 (1,9)$
 - $w'xz' \rightarrow 01_0 (4,6)$
 - $w'xy \rightarrow 011_ (6,7)$
 - $xyz \rightarrow _111 (7,15)$
 - $wyz \rightarrow 1_11 (11,15)$
 - $wx' \rightarrow 10_ _ (8,9,10,11)$

given minterms
in the question

Create the large table

	1	4	6	7	8	9	10	11	15
$x'y'z$	\otimes					\otimes			
$w'xz'$		\otimes	\times						
$w'xy$			\times	\times					
xyz				\otimes					\times
wyz								\times	\times
wx'					\otimes	\times	\otimes	\times	\times

Prime
Implicants

$x'y'z$ (1, 9) \rightarrow so put \times in both 1 and 9
Similarly, for all, put \times in corresponding spots.

→ Now, find the columns with only 1 X.
Here, 1, 4, 8 and 10. Mark them as circles.

→ Take the corresponding prime implicants. So,

$$1 \rightarrow x'y'z$$

$$4 \rightarrow w'xz'$$

$$8, 10 \rightarrow wx$$

→ Cancel both rows and columns for the marked X.

→ Once we are done upto this step, we will see that, some other X's have already been canceled out. ~~by~~ Now we can cancel those corresponding columns. Here, 6, 9, 11. These are marked with Blue pen.

[Important: Only columns, not rows in this step]

→ We still have some columns left to cancel. 7 and 15. Now we have to consider such a X ~~for which~~ as a circled one for which all other columns can be canceled out. In this case, the pink circle X. If we consider this, then that column and row can be canceled [pink]. For that, the X on 15 is also canceled. And for that, that whole column can be canceled.

→ Take $7 \rightarrow XYZ$

So, Final answer,

$$X'Y'Z + W'XZ' + XYZ + WX'$$

* However, we could also circle the X on 15 [pink star]. It would produce the same result.

FAQ: How can I do tabulation method if the question is like the following?

$$F = \sum (0, 1, 3, 5, 7, 11, 13) \text{ to}$$

$$d(2, 4, 6)$$

Ans: Up to prime implicants, you need to follow everything as the previous one. So no change.

Consider both minterms & don't cares F.

$$(0, 1, 3, 5, 7, 11, 13, 2, 4, 6)$$

everything

However,
When you create the large table,
don't put don't care terms in the columns.
That's the only difference.

notice, there isn't any 2, 4 or 6

0	1	3	5	7	11	13	-
0	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1

Then follow the previous rules and you
should get the final answer.

Practice from Slides [there is a
question with don't cares]