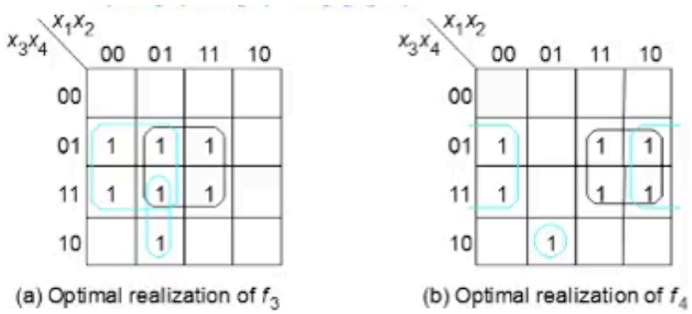
Don't care condition - that never occurs

Incompletely specified function - has Don't care conditions

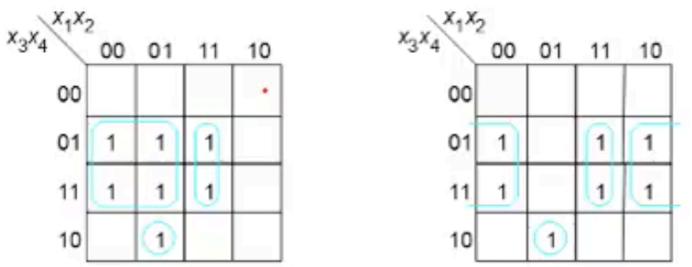
Don't cares are represented as: d in K-maps
D in SOP and POS

$$f = \sum m(1) + D(2,3) = \prod M(0) \cdot D(2,3)$$



(a) Optimal realization of f_3

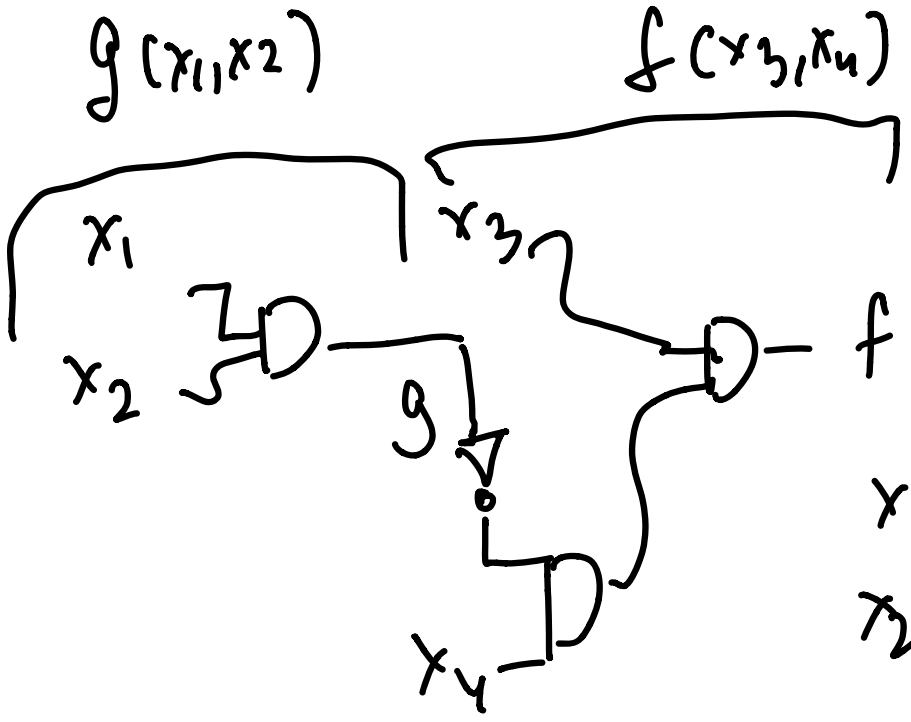
(b) Optimal realization of f_4



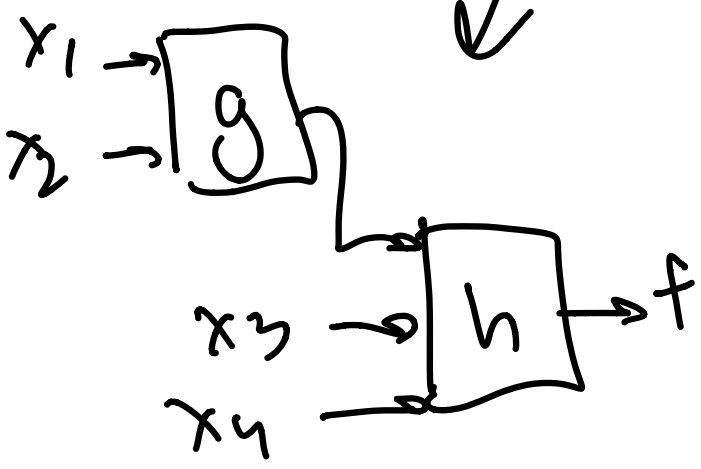
(c) Optimal realization of f_3 and f_4 together

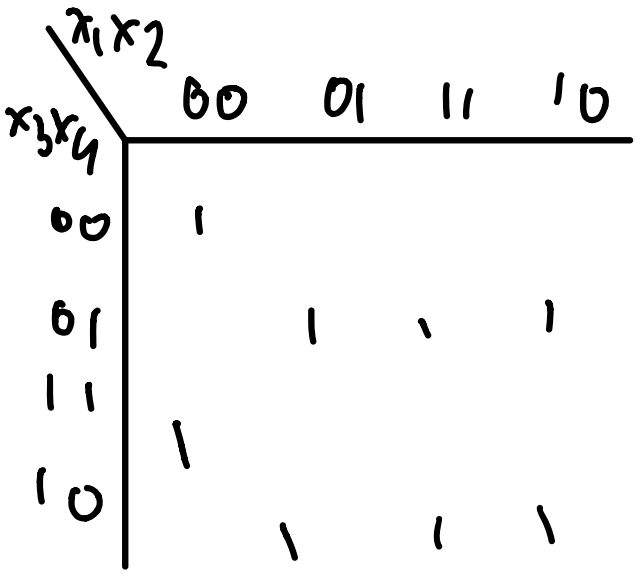
Fan-in problem occurs when the second level is huge
(1st is And for SOP, 2nd is OR)

Multilevel logic expression - solves fan-in
(cheaper, but slower)

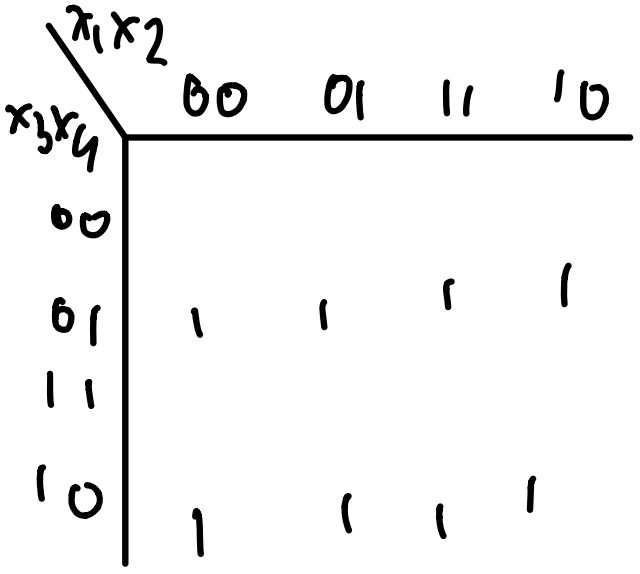


(block diagram)





$x_5 = 0$



$x_5 = 1$

$f = g\bar{k} + \bar{g}k$

$g = x_1 + x_2 + x_5$ $\quad k = \bar{x}_3 x_4 + x_3 \bar{x}_4$

$g(a) = a$ $\quad f(a,b) = gb$ (disjoint composition)

$f(a,b) = gb \fatsemi a$ (non-disjoint composition)

(because a is used locally and globally)