

Karnaugh Maps

Electrical Engineering

Grouping adjacent ones on a Gray-coded map to minimise up to four variables by eye.

Adjacency is the whole mechanism, so the cell order matters.

1

Lay out in Gray code

Neighbouring cells must differ in one variable only: 00, 01, 11, 10.

2

Fill from the truth table

One cell per table row; mark any don't-care conditions separately.

3

Group the ones

Rectangles of 1, 2, 4 or 8 cells, wrapping round edges and corners.

4

Make each group as large as it can be

Every doubling of a group removes one variable from that term.

5

Read each group off

Keep the variables that stay constant; drop the ones that change.

Overlapping groups are allowed and often necessary. A don't-care may be read as 1 whenever doing so enlarges a group.