

1.4 DATA TYPES & STRUCTURES · 1.4.3

Karnaugh maps

Visual Boolean simplification: layout & grouping rules. Spec 1.4.3(b).

01 The map

What Grid of outputs; write **1** where the expression is true.

Labels **Gray code:** **00 01 11 10** — neighbours differ by one variable.

Sizes 2 vars = 2×2; 4 vars = 4×4 (cols CD, rows AB).

Edges **Wrap around:** left↔right, top↔bottom, corners.

02 Grouping rules

Shape Rectangles of 1s; size = power of 2 (1,2,4,8).

Big As **large** as possible (more variables removed).

Few As **few** groups as possible; may **overlap**.

Read Keep variables that stay **constant**; OR the groups.

03 How much each group removes

Group 2 Removes **1** variable.

Group 4 Removes **2** variables.

Group 8 Removes **3** variables.

Squares per term 4-var term = 1 sq · 3-var = 2 · 2-var = 4 · 1-var = 8.

Example Top-left 2×2 (A=0,C=0) → **¬A · ¬C**.

FINAL PASS BEFORE THE EXAM

Rapid exam tips

Six slips on K-map questions.

01

Label in **Gray code** (00 01 11 10), never plain binary order.

02

Group sizes are **powers of 2** only — never 3.

03

Make groups **as large** as possible to remove the most variables.

04

Don't miss **wrap-around** groups (edges & corners).

05

In a group, **drop** any variable that changes; keep the constants.

06

Cover every 1 with as **few** groups as possible (overlap is fine).