

Karnaugh Map Tutorial

A Worked Example

For

Karnaugh Maps

Problem Statement

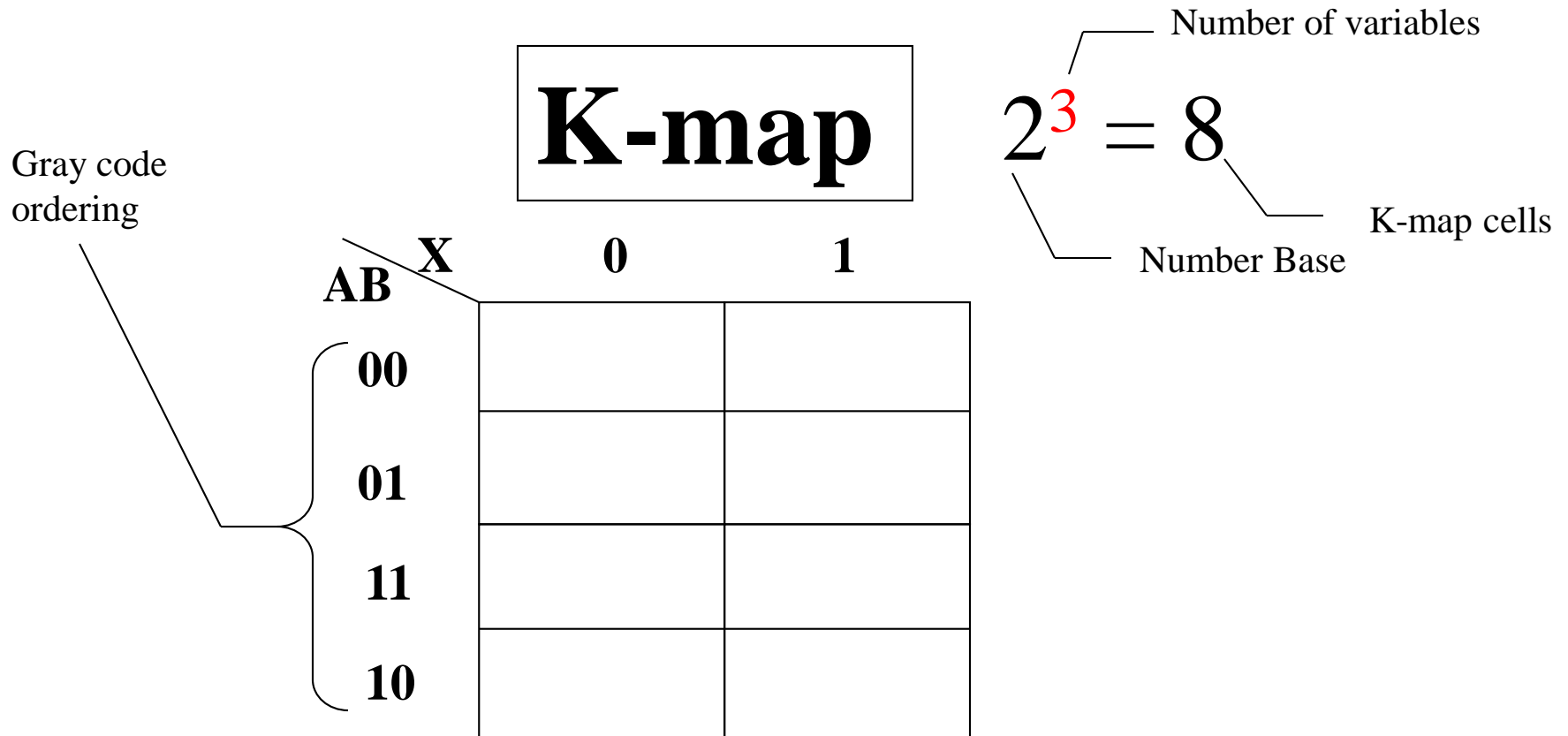
Given the Boolean equation: $F = AB + B'C$

Use a Karnaugh Map to minimize F

The Approach

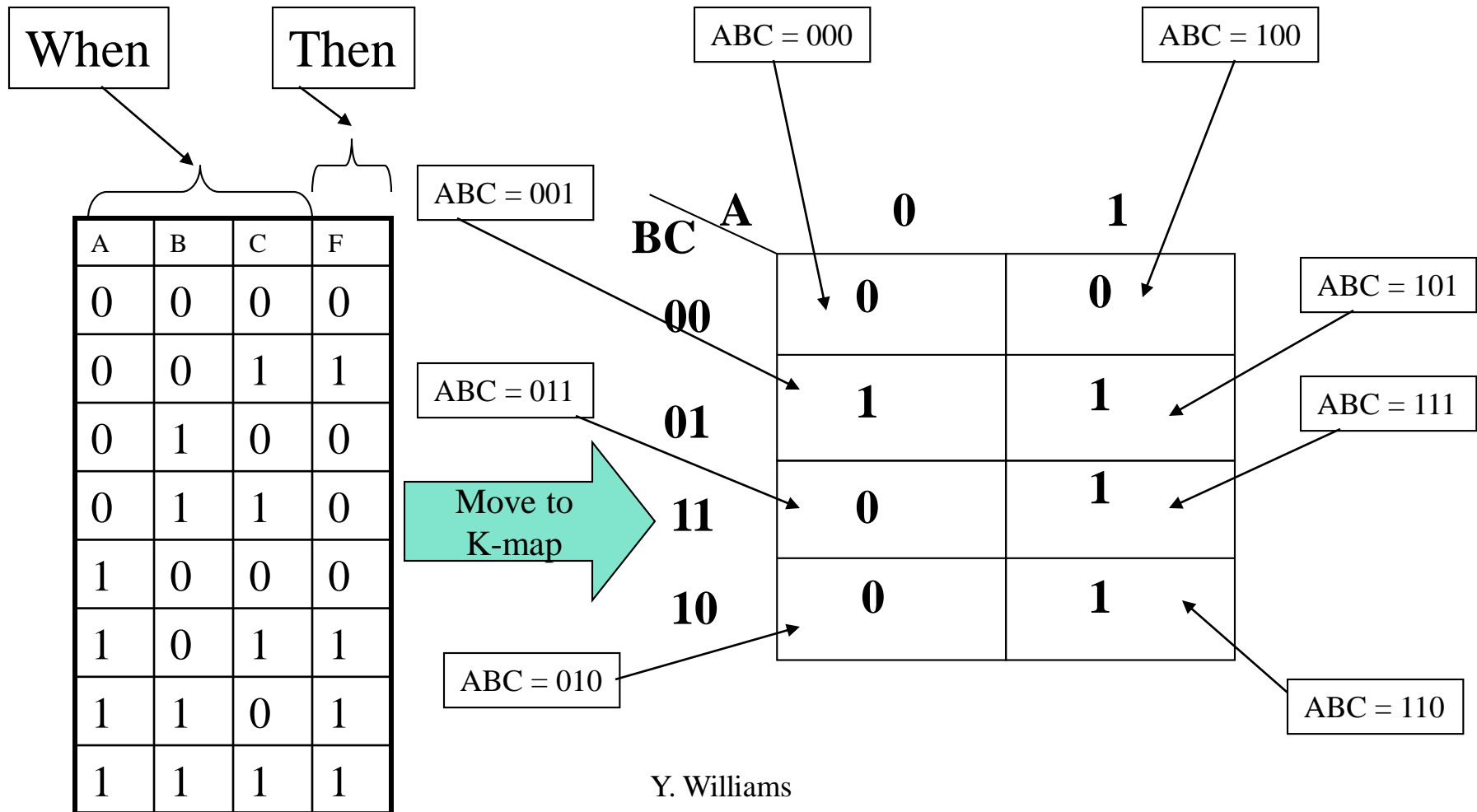
- Determine the size (number of cells required) for the K-map
 - Count the number of variables in the expression (not including their respective complementary representations)
 - This value m becomes the logarithm (base 2) that determines the number of required K-map cells (i.e. $2^m = x$, where x = the number of K-map cells)
 - The expression $AB + B'C$ has 3 variables $\{A,B,C\}$, therefore, $m = 3$ and $2^3 = 8$.
 - Eight K-map cells, then, are required in order to minimize this expression.

Setting up the K-map

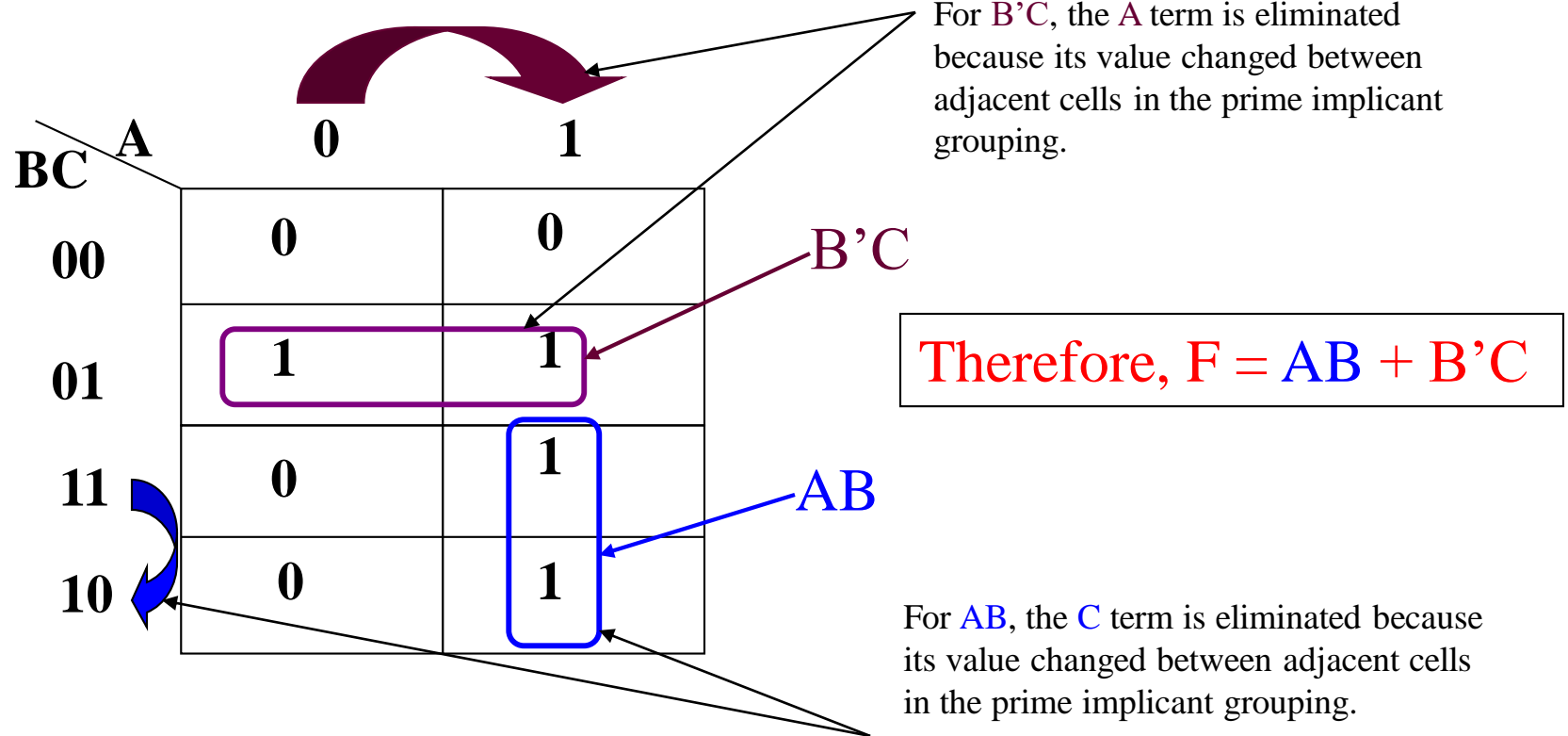


Populating the K-map with Values

The cells in the table represent F when the expression variables $\{A, B, C\}$ take on values from the set $\{0, 1\}$.



Forming Prime Implicants



Remember to combine adjacent 1's in powers of 2 groupings. Stop grouping when all the 1's are in a group!!

$$F = AB + B'C$$

- Since the minimized equation is the same as the original equation (for this example only), indicates that the original equation was already minimized.
- The important information from this example was the **process** of logic expression minimization using the K-map!!