

K-Maps continue

# **SIMPLIFY A LOGIC EXPRESSION USING K-MAPS**

# Simplify an expression using K-maps

Given,

$$X = \overline{A} \overline{B} \overline{C} + \overline{A} B + \overline{B} C$$

# Simplify an expression using K-maps

Given,

$$X = \overline{A} \overline{B} \overline{C} + \overline{A} B + \overline{B} C$$

Simplify the above expression, using K-maps.

# Set-up K-map table

AB \ C	C	
	0	1
00	1	
01		
11		
10		

$\overline{A} \overline{B} \overline{C}$

# Set-up K-map table

$$X = \overline{A} \overline{B} \overline{C} + \overline{A} B + \overline{B} C$$

AB \ C	C	
	0	1
00	1	
01	1	1
11		
10		

$$\overline{A} \overline{B} \overline{C} + \overline{A} B$$

# Set-up K-map table

$$X = \overline{A} \overline{B} \overline{C} + \overline{A} B + \overline{B} C$$

AB \ C	C	
	0	1
00	1	1
01	1	1
11		
10		1

$$\overline{A} \overline{B} \overline{C} + \overline{A} B + \overline{B} C$$

# A more systematic way ...

		C	
		0	1
AB	00	1	
	01		
	11		
	10		

$$\overline{A}\overline{B}\overline{C} + \overline{A}B + \overline{B}C$$

A	B	C	$A'B'C'$	$A'B$	$B'C$
0	0	0	1		
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

# Set-up K-map table

AB \ C	C	
	0	1
00	1	
01	1	1
11		
10		

$$\overline{A}\overline{B}\overline{C} + \overline{A}B + \overline{B}C$$

A	B	C	A'B'C'	A'B	B'C
0	0	0	1		
0	0	1			
0	1	0		1	
0	1	1		1	
1	0	0			
1	0	1			
1	1	0			
1	1	1			



# Set-up K-map table

		C	
		0	1
AB	00	1	1
	01	1	1
	11		
	10		1

$$\overline{A}\overline{B}\overline{C} + \overline{A}B + \overline{B}C$$

A	B	C	A'B'C'	A'B	B'C
0	0	0	1		
0	0	1			1
0	1	0		1	
0	1	1		1	
1	0	0			
1	0	1			1
1	1	0			
1	1	1			

# Simplification

AB \ C	C	
	0	1
00	1	1
01	1	1
11		
10		1

# Simplification

		C	
		0	1
AB	00	1	1
	01	1	1
	11		
	10		1

$$X = \overline{A} + \overline{B}C$$

# Another useful example...

$$X = AB + \overline{A}C + BC$$

# Another useful example...

AB \ C	0	1
00		
01		
11		
10		

$$X = AB + \overline{A}C + BC$$

# AB

		C	
		0	1
AB	00		
	01		
	11	1	1
	10		

$$X = AB + \overline{A}C + BC$$

$A'C$

		C	
		0	1
AB	00		1
	01		1
	11	1	1
	10		

$$X = AB + \overline{A}C + BC$$

# BC

		C	
		0	1
AB	00		1
	01		1 1
	11	1	1 1
	10		

$$X = AB + \overline{A}C + BC$$



# Consensus theorem

		C	
		0	1
AB	00		1
	01		1
	11	1	1
	10		

$$X = AB + \overline{A}C + BC$$

# Consensus theorem

AB \ C	C	
	0	1
00		1
01		1
11	1	1
10		

...useful algebraic  
simplification  
theorem

$$X = AB + \overline{A}C + BC = AB + \overline{A}C$$

# Using the Table

A	B	C	AB	A'C	BC
0	0	0			
0	0	1		1	
0	1	0			
0	1	1		1	1
1	0	0			
1	0	1			
1	1	0	1		
1	1	1	1		1

- How can we simplify the table?
- Why it is:  $AB + AC'$
- (project or independent study = 3 credits research)

# Consensus Theorem

- $AB + A'C + BC$
- $AB + A'C + 1 BC$
- $AB + A'C + (A + A') BC$
- $AB + A'C + ABC + A'BC$
- $AB(1+C) + A'C(1+B)$
- $AB + A'C$
- Which is ...  $AB + A'C + BC = AB + A'C$

# K-Map simplification technique

- Good only for small circuits
- Excellent academic method
- There are better computer-based techniques

# WWW-based simplification method

Tomaszewski, S.P, I.U. Ilgaz and Antoniou, G.E. (2003).  
**WWW-Based Boolean function simplification**, *International Journal of Applied Mathematics and Computer Science*, 13 (4), 577-583.

---

Quine W.V. (1952). The problem of simplifying truth tables, *American. Math. Monthly*, 59(8), 521-531.

McCluskey E.J. (1956). Minimization of Boolean functions, *Bell System Technical Journal*, 35(5), 1417-1444.

Sebastian Tomaszewski and I.U. Ilgaz are MSU/CS Alumni (2002)

# PDA-based simplification

**Kmap 4-variable**

Truth Table

abcd	
abcd	0
abcD	1
abCd	0
abCD	0
aBcd	0
aBcD	1
aBCd	1
aBCD	1
Abcd	0
AbcD	0
AbCd	0
AbCD	1
ABcd	1
ABcD	1
ABCD	0
ABCD	1

Kmap Table

	cd	cD	CD	Cd
ab	0	1	0	0
aB	0	1	1	1
AB	1	1	1	0
Ab	0	0	1	0

Reset Simplify

acD + aBC + ABc + ACD

BFS tool 2:45

**Four Variables**

abcd	Abcd	ab	cd	cD	CD	Cd
abcd	0	ab	0	1	0	0
abcD	0	AbcD	0	0	1	0
abCd	0	AbCd	0	1	1	1
abCD	0	AbCD	1	1	1	0
aBcd	0	ABcd	1	1	1	0
aBcD	1	ABcD	1	0	1	0
aBCd	1	ABCd	0	0	1	0
aBCD	1	ABCD	1			

(Simplify)

The optimal solution is:  
 $acD + aBC + ABc + ACD$   
 50 ms for optimization.

# PDA-based simplification

Ledion Bitincka, George E. Antoniou, (2004), **PDA-Based Boolean Function Simplification: A Useful Educational Tool**, *International Journal INFORMATICA*, Vol. 15, No. 3, pp. 329-336.

Ledion Bitincka, George E. Antoniou, (2005), **Pocket-PC Boolean Function Simplification**, *International Journal in Electrical Engineering*, Vol. 56, No. 7-8, pp. 1-4.



# BFSTool 1.0 (Softpedia)

★ BOOKMARK THIS SITE    🔍 SEARCH  GO    🛒 DOWNLOAD BASKET    🐦 FOLLOW US ON TWITTER!    👤 YOUR ACCOUNT

## SOFTPEDIA®

Updated one minute ago

SOFTPEDIA® DISCOUNTS 2009  
Holiday Prices!

TODAY'S NEWS: Building Dark Energy Detectors Is Tough

🏠 WINDOWS    🎮 GAMES    🚗 DRIVERS    🍏 MAC    🐧 LINUX    📜 SCRIPTS    📱 MOBILE    🖱️ HANDHELD    🧰 GADGETS    📰 NEWS

🔍 DEVICE FINDER

HANDHELD CATEGORIES:

- Business
- Desktop and Shell
- Developer Tools
- Documents / E-Books
- Educational
- Finance
- Games
- Graphics
- Health
- HOBBIES
- Internet Utilities
- Multimedia
- Quiz
- Security
- System Utilities
- Travel
- Word Processing/Text Tools

MOBILE BRANDS:

- Acer
- AnexTek
- ASUS
- Audiovox
- BenQ

Home / Handheld / Business / Engineering

### Boolean Function Simplification Tool 1.0

**TRACFONE**  
THE CELL PHONE THAT PUTS YOU IN CONTROL

**GET NO-CONTRACT WIRELESS** ▶ SHOP PHONES

**DOWNLOAD**

Downloads: 2,846    ➕ Add to download basket    🗨️ Tell us about an update

★★★★☆    User Rating: Good (3.5/5)  
Rated by: 29 user(s)

Developer: [MSU](#) | [More programs](#)

License / Price: Freeware / FREE

Size / OS: 18 KB / PalmOS

Last Updated: March 20th, 2006, 08:13 GMT

Category: [C: \ Business \ Engineering](#)

[Read user reviews \(1\)](#)    [Add a review](#)    [Refer to a friend](#)    [Subscribe](#)



[View more screenshots \(1\)](#)

### Boolean Function Simplification Tool description

[Ads by Google](#)    [Palm Game Downloads](#)    [Palm OS PDA](#)    [PDA Handheld Review](#)    [Palm Pre](#)    [Palm Desert Weather](#)

# BFSTool 1.0 (Freeware Palm OS)

palm freeware Boolean Function Simplification Tool 1.0 [Palm software](#) • [Palm blog](#) • [Pocket PC Freeware](#) • [Smartphone Freeware](#) • [Symbian freeware](#) • [BlackBerry Downloads](#)



3443 readers  
BY FEEDBURNER



## » PunchBoard Card Game



Free Card Game for Palms

## » Popular Palm freeware tags:

wireless games  
misc/fun  
business puzzle  
music clock medical  
utilities sports  
board communication

## Freeware tags

» action  
» adventure  
» airport  
» arcade  
» astrology  
» astronomy  
» audio / music

ServiceDesk Plus  
10,000 Customers Love Their HelpDesk  
Download Now

» Palm OS freeware and games!  
More than 9,400 free Palm software, medical applications, bluetooth and GPS tools for Tungsten, LifeDrive and Treo handhelds.

Wireless, dictionary and battery Palm freeware together with ebooks, business, database and phone applications absolutely free for Your Palm OS PDA or Phone.

## » Search for freeware titles:

Google Custom Search  
Search

★ [Bookmark](#)  
Freeware - Palm.com

Mobile friendly downloads at  
[Palm Freeware .mobi](#)

## » Boolean Function Simplification Tool 1.0

[Ads by Google](#) [Palm Freeware](#) [Palm Pre Games](#) [Pilot Freeware](#) [Pre Phone](#)

• Summary: A useful educational tool is presented, for students in Computer Science and Electrical and Computer Engineering, for minimizing low order Boolean expressions.

## Requirements:

- Arrived: 2005-10-13
- Found under: [Education / Reference, College](#).
- Social Action: [Bookmark](#)

## Registry Defrag

Defrag Registry, Boost PC Speed  
Microsoft Certified. Free Download

Ads by Google



5.0/5 (1 vote)


Four Variables

abcd	Abcd	aBcd	ABcd	cd	-D	CD	Cd
abcd	Abcd	aBcd	ABcd	0	1	0	0
abCd	AbCd	aBcd	ABcd	0	1	1	1
abCD	AbCD	aBCD	ABCD	0	1	1	1
abCd	AbCd	aBcd	ABcd	0	0	1	0
abCD	AbCD	aBCD	ABCD	0	0	1	0
abCd	AbCd	aBcd	ABcd	0	0	0	1
abCD	AbCD	aBCD	ABCD	0	0	0	1

The optimal solution is:  
 $acD + aBc + BcC + BCD$   
50 ms for optimization.

Web based  
IT Helpdesk  
with  
Asset  
and  
Purchase  
Management  
Starts at  
\$995  
ManageEngine ServiceDesk plus

# BFSTool 1.0 (WareSeeker)

[Windows](#) | [Mac](#) | [iPhone](#) | **[Pda](#)** | [Driver](#) | [Linux](#) | [Script](#) | [Mobile](#) | [RSS](#) | [Bookmark](#) | [WorldWide](#) 

**WareSeeker.com!**  
PDA


[PDA](#) [Search](#) [Advanced search](#)

[Main](#) > [Business](#) > [Engineering](#) > Boolean Function Simplification Tool 1.0 [Login](#) [Register now](#)

**Boolean Function Simplification Tool 1.0**

Sponsored Links


[Elisa Curve-Fitting](#)  
Full Support for 4-PL & 5-PL. Download Free Trial Now!  
[www.MiraiBio.com/Elisa-Curve-Fit](http://www.MiraiBio.com/Elisa-Curve-Fit)






[Nexus One by Google](#)   
Smart, Slim, Speedy & Simple To Use From Just \$179 w/ Plan. Buy Online!  
[www.google.com/phone](http://www.google.com/phone)

[Curve Fitting Software](#)  
Robust curve fitting: nonlinear, linear, multiple & arbitrary models  
[www.polysoftware.com](http://www.polysoftware.com)

Ads by Google

**Boolean Function Simplification Tool 1.0 Ranking & Summary**


Ranking	Click at the star to rank	File size:	18.00 KB
Ranking Level	☆☆☆☆☆	Platform:	PalmOS
User Review:	7 (2 times)	License:	Freeware
 <b>Download now</b>		Price:	FREE
		Downloads:	118
		Date added:	2006-03-20
		Publisher:	MSU

 [Print this page](#)  [Report broken link](#)  [Report a spam](#)  [Add a review](#)  [Send to a friend](#)

**Boolean Function Simplification Tool 1.0 description**

**FEATURED SOFTWARE**

Want to place your software product here?  
Please contact us for consideration.  
[Contact WareSeeker.com](#)


 **Embed software to your page** [NEW](#)

Advertisement

[Google Ends Censorship in China](#)  
Google has declared to stop censoring search results in China  
[technology.ezine seeker.com](http://technology.ezine seeker.com)

[ACA System Restore](#)  
an advanced system restore software that can recover your PC from any kind of PC problems in seconds even if Windows can't boot  
[www.acasystemrestore.com](http://www.acasystemrestore.com)

**SPONSORED LINKS**

[Google Nexus One- 3D Tour](#)   
Slim Sleek Design, 1GHz Processor Available Exclusively Online Here!  
[www.google.com/phone](http://www.google.com/phone)

[Curve Fitting Software](#)  
Robust curve fitting: nonlinear, linear, multiple & arbitrary models  
[www.polysoftware.com](http://www.polysoftware.com)

# BFSTool 1.0 (rbytes reviews)

The screenshot shows the 'rbytes reviews' website interface. At the top, there's a navigation bar with 'en | de' on the left, a search bar with a 'SEARCH' button in the center, and a 'login' button on the right with a link 'Not registered yet?'. Below the navigation bar, a breadcrumb trail reads: 'Mobile Reviews and Downloads > Business > Engineering > Boolean Function Simplification Tool 1.0 mobile review'. On the left side, there's a 'Categories' sidebar with a yellow background, listing various categories like Business, Desktop, Developer Tools, Education, Finance, Games, and Graphics. The 'Business' category is expanded, showing a list of sub-categories including Address Book, Calculator, Calendar, Clock, Convertors, Databases, Electrical, Engineering, Finance, List Managers, Organizer, PIM, Project Management, Shopping, and Time Tracker. The main content area on the right is titled 'Boolean Function Simplification Tool 1.0 review (mobile)' and includes a star rating 'Add to Watch List' and a 'register' link. The review text describes the tool as a useful educational software for minimizing low order Boolean expressions, developed by MSU. It mentions the license is Freeware, OS is PalmOS, file size is 18K, and price is \$0.00. The user rating is shown as five empty stars. The review also details the implementation using C++ on the CodeWarrior for Palm Operating System environment and mentions the application can be used by students and professors in electrical and computer engineering and computer science. Requirements listed include Palm OS v3.0. A note at the bottom states that downloading the tool will take several seconds if using a fast ADSI connection.

en | de

rbytes reviews

SEARCH

login  
Not registered yet?

Mobile Reviews and Downloads > Business > Engineering > Boolean Function Simplification Tool 1.0 mobile review

## Categories

### Business

- [Address Book](#)
- [Calculator](#)
- [Calendar](#)
- [Clock](#)
- [Convertors](#)
- [Databases](#)
- [Electrical](#)
- [Engineering](#)
- [Finance](#)
- [List Managers](#)
- [Organizer](#)
- [PIM](#)
- [Project Management](#)
- [Shopping](#)
- [Time Tracker](#)

### Desktop

### Developer Tools

### Education

### Finance

### Games

### Graphics

## Boolean Function Simplification Tool 1.0 review (mobile)

Add to Watch List ★  
[register](#)

A useful educational tool is presented for minimizing low order Boolean expressions.

License: [Freeware](#)  
OS: PalmOS  
File size: 18K  
Developer: [MSU](#)  
Price: \$0.00

User Rating: ★★★★★

Boolean Function Simplification Tool 1.0 is engineering software developed by MSU.  
A useful educational tool is presented for minimizing low order Boolean expressions.

The algorithm follows the Karnaugh map looping approach and provides optimal results.

For the implementation, C++ was used on the CodeWarrior for Palm [Operating System](#) environment.

In order to make the overall implementation efficient, the object oriented approach was used.

The proposed [application](#) can be used by students and professors in the fields of electrical and [computer](#) engineering and computer science.


Requirements:



- Palm OS v3.0  
This engineering software is freeware, which means you can download and use Boolean Function Simplification Tool 1.0 absolutely free. There's no need to buy the product. Boolean Function Simplification Tool 1.0 supports english interface languages and works with PalmOS.

Downloading Boolean Function Simplification Tool 1.0 will take several seconds if you use fast [ADSI](#) connection.

Done

# BFSTool 1.0 (Shareware)


 **SHARE WARE**

**Big bang for your training buck.**   
Learn .NET including SharePoint®, SQL Server®, Visual Studio® and more—all for **JUST \$99**

WINDOWS GAMES DRIVERS MAC LINUX **SCRIPTS** HANDHELD IT EXPERTS

HANDHELD CATEGORIES:

- Business
- Desktop and Shell
- Developer Tools
- Documents / E-Books
- Educational
- Finance
- Games
- Graphics
- Health
- HOBBIES
- Internet Utilities
- Multimedia
- Quiz
- Security
- System Utilities
- Travel
- Word Processing / Text Tools

**Save with the Premiere Bug Tracking Software!**  


- Bug Tracking
- Scrum
- Projec Mgmt.


**Get Started!**  
asp.netPRO Magazine Readers' Choice 4 Years Running  
**OnTime 2009 axosoft**



- Build rock-solid LINQ data layers
- Superior usability
- Powerful Visual Studio wizards

**Show step-by-step instructions...**

- Tables
- Views
- Stored Procedures



**Boolean Function Simplification Tool 1.0**  
[Ads by Google](#) [Algebra Math Help](#) [L Band Variable Gain](#) [Algebra Calculator](#) [Algebra Calculations](#) [Algebra.com](#)

**A useful educational tool is presented for minimizing low order Boolean expressions. The algorithm follows the Karnaugh map looping approach and provides optimal results.**


A useful educational tool is presented for minimizing low order Boolean expressions.

The algorithm follows the Karnaugh map looping approach and provides optimal results.

For the implementation, C++ was used on the CodeWarrior for Palm Operating System environment.

In order to make the overall implementation efficient, the object oriented approach was used.

The proposed application can be used by students and professors in the fields of electrical and computer engineering and computer science.



# BFSTool 1.0 (Mobile fun.net)

FREE BOOLEAN FUNCTION SIMPLIFICATION TOOL V1.0 DOWNLOAD

 mobile fun.net

HOME POCKET PC SYMBIAN PALMOS SMARTPHONE K-JAVA

saying  
  
going



Introducing the Nexus One,  
with voice navigation.

Get Nexus One

[Solving Linear Equations?](#)  
Solve linear equations fast with Algebrator's step-by-step answers!  
[www.Algebra-Help.com](http://www.Algebra-Help.com)

[Definition Of Science Variable](#)  
All About Definition Of Science Variable News and much More!  
[Peeplo.com/Top\\_Results](http://Peeplo.com/Top_Results)

[Simplify Algebra](#)  
Algebra Solver simplifies, explains algebraic equations. \$58.99  
[www.AlgebraSolver.com](http://www.AlgebraSolver.com)

Ads by Google


Software: Boolean Function Simplification Tool v1.0  
Sub-Category: Education & Reference  
Publish Date: September 26, 2005  
Size: 13 KB  
Operation System: • Any hardware  
• Palm OS v3.0  
Publish Company: Official Publish  
Software introduce:

**Four Variables** A useful educational tool is presented for

Done

Internet | Protected Mode: On

# BFSTool 1.0 (Handy Byte)



## Handy Byte


pocket pc/palm downloads

[search](#)

Ads by Google


[Electrical Engineering](#)  
[Pocket PC Video](#)  
[Engineering College](#)  
[Computer Engineering](#)  
[Engineering Career](#)

### Featured Software


[Resco Photo Viewer for Smartphone 5.33](#)

Resco Photo Viewer is:


- an ideal enhancement to your digital camera.

[SmartMovie for Smartphone 3.31](#)

SmartMovie is a video player for your mobile device, with counterpart [PC converter](#) utility.

[Spybot - Search & Destroy \(Pocket PC\) 0.3.0](#)

While viruses for Symbian and Windows Mobile currently seem more like proof-of-concept studies, the Windows [Mobile platform](#) offers malware writers who already know Windows a very similar environment.








[Home](#)  [RSS](#)


[Most Popular](#) [New & Updated](#) [Top Rated](#) [Search](#) [Authors](#) [Contact Us](#)

[Handy Downloads](#) > [Business](#) > [Engineering](#) > **Boolean Function Simplification Tool 1.0**

## Boolean Function Simplification Tool 1.0

A useful educational tool is presented for minimizing low order Boolean expressions.

Developer:	 <a href="#">MSU</a> <a href="#">more software by author →</a>
Price:	\$ 0.00
License:	 <b>Freeware</b>
File size:	 <b>18K</b>
Language:	
OS:	 <b>PalmOS</b>
Rating:	 <b>0</b> / 5 (0 votes)
Your vote:	

 [enlarge screenshot](#)

[Engineering Change Mgmt](#)  
ECN:Engineering Change Notification Solutions.  
Read the PLM Whitepaper!  
[www.ArenaSolutions.com](#)

[Polytechnic Institute NYU](#)  
NYC's most comprehensive school of engineering, science and technology  
[www.poly.edu/admit](#)

[Elec. Engineering Degrees](#)  
Study Elec. Engineering Online and Earn a Degree. Request Free Info!  
[www.eLearners.com/ElectEngineering](#)

[Review & Doc Tools C/C++](#)  
Flowcharts, DataFlow, Code Metrics Trees, Static Check, Documentation  
[www.sgvsarc.com](#)

Ads by Google

A useful educational tool is presented for minimizing low order Boolean expressions.



# Incompletely specified functions\*

- In some design problems a number of the inputs never occur, so there is no specified output. Such an output is denoted by (X) and is called **Don't Care Condition**.

\* ISF



# ISF-Example

The output (Z) of a three-input  $F(A,B,C)$  digital circuit is:

- 0 if  $F(A,B,C) \leq 2_{10}$
- 1 if  $F(A,B,C) \geq 5_{10}$
- **x** otherwise

Set-up the Truth Table

# Truth table

The output (Z) of a three-input  $F(A,B,C)$  digital circuit is:

- 0 if  $F(A,B,C) \leq 2_{10}$
- 1 if  $F(A,B,C) \geq 5_{10}$
- x otherwise

	A	B	C	Z
0	0	0	0	
1	0	0	1	
2	0	1	0	
3	0	1	1	
4	1	0	0	
5	1	0	1	
6	1	1	0	
7	1	1	1	

In some design problems a number of the inputs never occur, so there is no specified output. Such an output is denoted by (X) and is called **don't care condition**.

# Truth table

The output (Z) of a three-input  $F(A,B,C)$  digital circuit is:

- 0 if  $F(A,B,C) \leq 2_{10}$
- 1 if  $F(A,B,C) \geq 5_{10}$
- x otherwise

	A	B	C	Z
0	0	0	0	0
1	0	0	1	0
2	0	1	0	0
3	0	1	1	X
4	1	0	0	X
5	1	0	1	1
6	1	1	0	1
7	1	1	1	1

# Output and don't care equations

$Z =$

and

$X =$

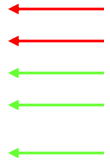
# Output and don't care equations

$$Z = A \bar{B} C + A B \bar{C} + ABC$$

and

$$X = \bar{A} B C + A \bar{B} \bar{C}$$

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	X
1	0	0	X
1	0	1	1
1	1	0	1
1	1	1	1



# Set-Up K-map table - Z

AB \ C	C	
	0	1
00		
01		
11		
10		

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	X
1	0	0	X
1	0	1	1
1	1	0	1
1	1	1	1

# Set-Up K-map table - Z

AB \ C	C	
	0	1
00		
01		
11	1	1
10		1

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	X
1	0	0	X
1	0	1	1
1	1	0	1
1	1	1	1

# Set-Up K-map table

AB \ C	C	
	0	1
00		
01		X
11	1	1
10	X	1



# Optimal values

AB \ C	C	
	0	1
00		
01		$X = 0$
11	1	1
10	$X = 1$	1

$Z = ?$



# Result: $Z = A$

AB \ C	C	
	0	1
00		
01		X = 0
11	1	1
10	X = 1	1

$Z = A$

