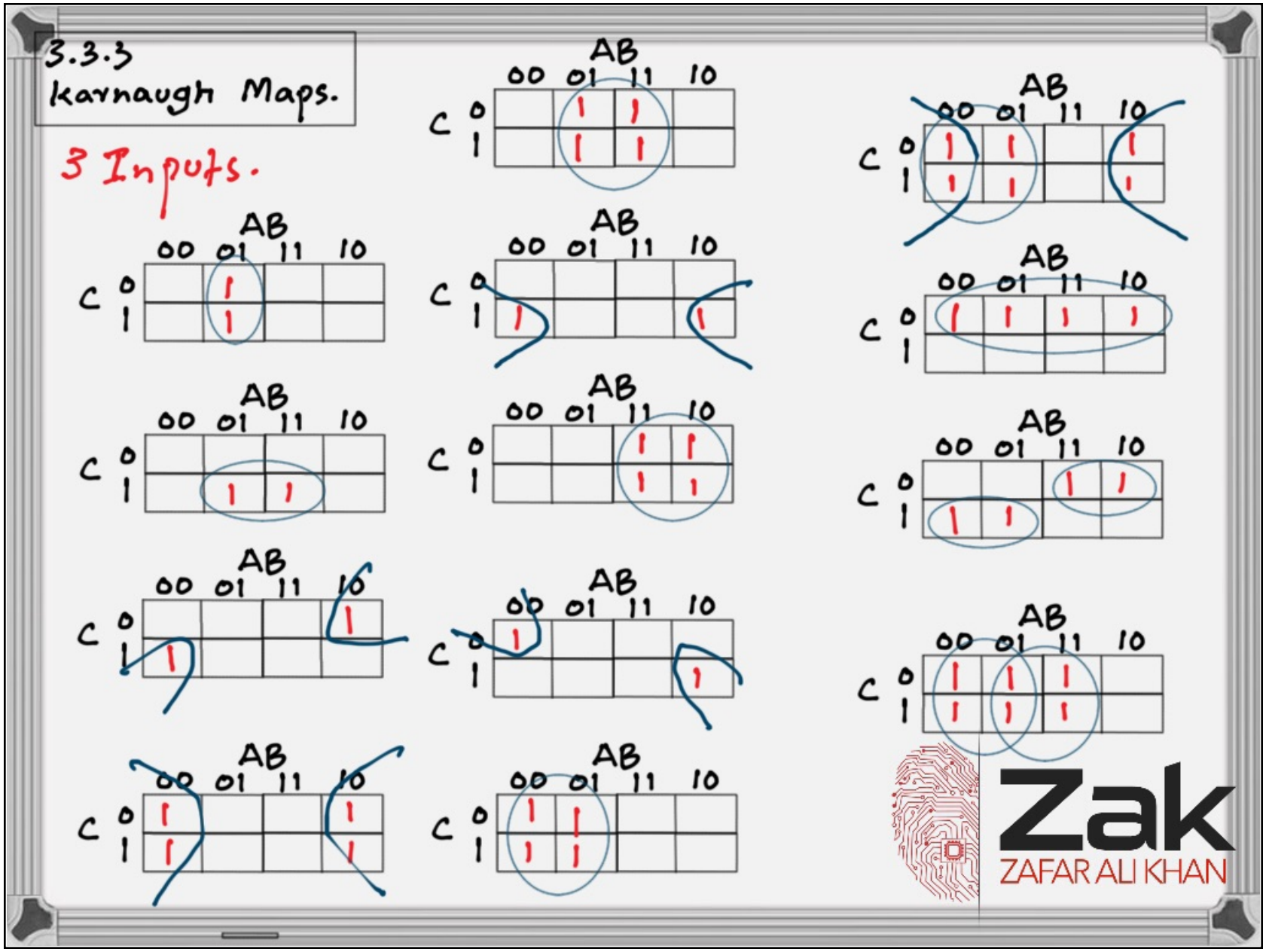
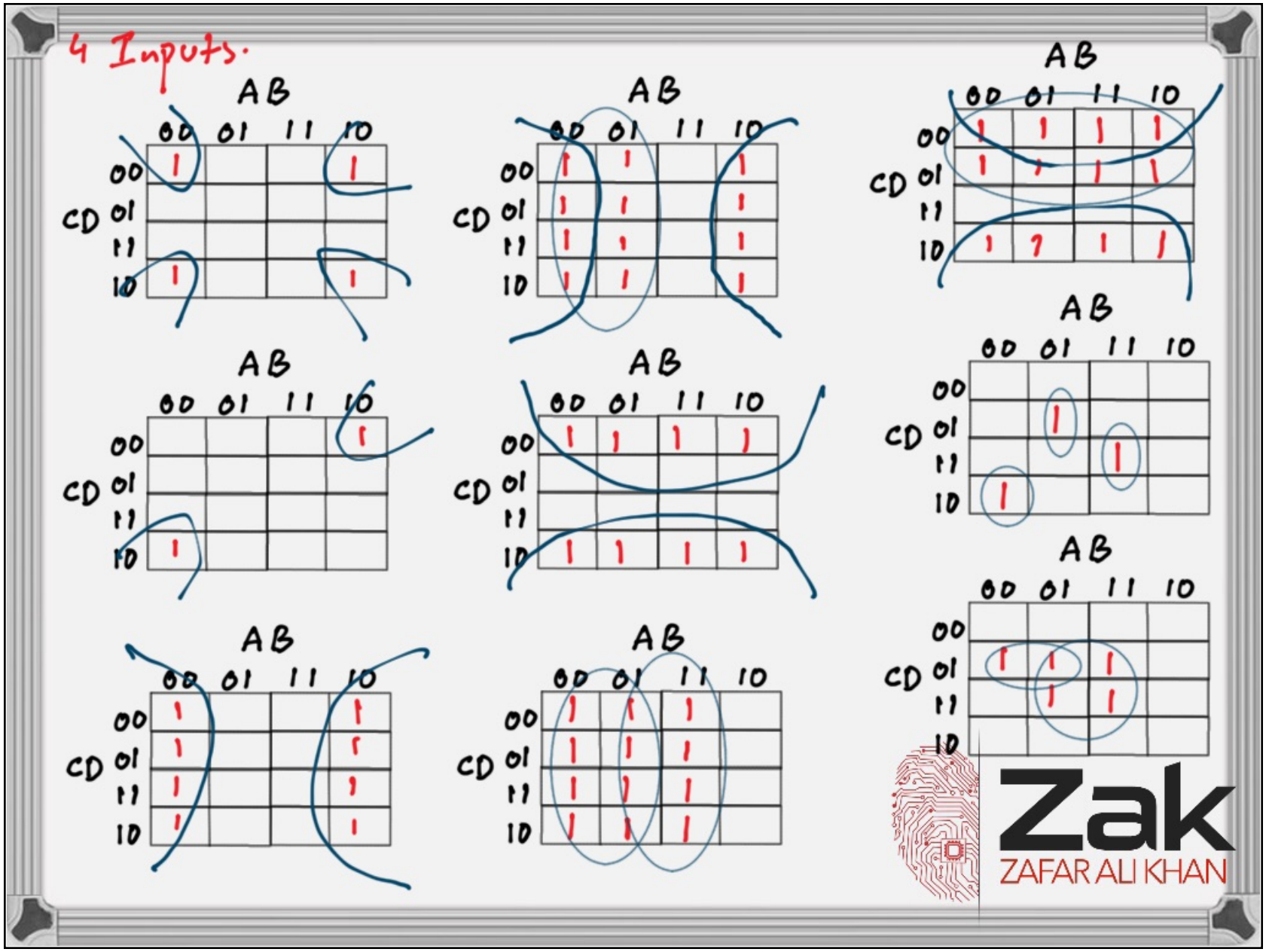

3.3.3
karnaugh Maps.
3 Inputs.
AB
00 01 11 10
C
0
1
Zak
ZAFAR ALI KHAN


4 Inputs.
AB
CD
00 01 11 10
Zak
ZAFAR ALI KHAN

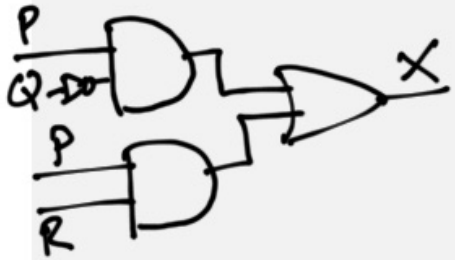
INPUT				OUTPUT	
P	Q $\bar{Q}$	R	$P\bar{Q}$	PR	Z
0	0 1	0	0	0	0
0	0 1	1	0	0	0
0	1 0	0	0	0	0
0	1 0	1	0	0	0
1	0 1	0	1	0	1 ✓ $P\bar{Q}\bar{R}$
1	0 1	1	1	1	1 ✓ $P\bar{Q}R$
1	1 0	0	0	0	0
1	1 0	1	0	1	1 ✓ PQR

Sum of products

$Z = P\bar{Q}\bar{R} + P\bar{Q}R + PQR$

100 101 111

$Z = P\bar{Q} + PR$ Ans.



ii) For the truth table above complete the Karnaugh Map (K-map).

Loops

32 16 8 4 2 1

R \ PQ	00	01	11	10
0				1 ✓
1			1 ✓	1 ✓

$P\bar{Q}\bar{R}$

$P\bar{Q}R$

$P\bar{Q}$

$P\bar{Q}\bar{R}$

PQR

PR

Zak ZAFAR ALI KHAN

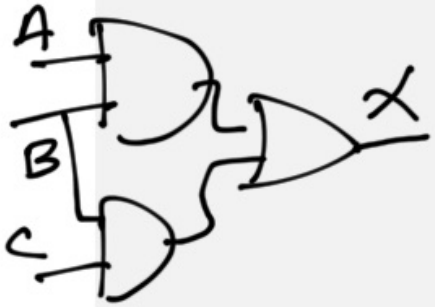
5 (a) (i)

INPUT						OUTPUT
A	B	AB	C	BC		X
0	0	0	0	0		0 ✓
0	0	0	1	0		0 ✓
0	1	0	0	0		0 ✓
0	1	0	1	1		✓ 1 ✗ $\bar{A}BC$
1	0	0	0	0		✓ 0
1	0	0	1	0		✓ 0
1	1	1	0	0		✓ 1 ✗ $AB\bar{C}$
1	1	1	1	1		✓ 1 ✗ ABC

$X = \bar{A}BC + AB\bar{C} + ABC$

Sum of products.

$X = AB + BC$



(ii) For the truth table above complete the Karnaugh Map (K-map).

C \ AB	00	01	11	10
0			1 ✓	
1		1	1 ✓	

$AB\bar{C}$. ABC → AB

$\bar{A}BC$. ABC → BC

(b) The truth table for a logic circuit with four inputs is given below:

INPUT				OUTPUT
P	Q	R	S	Z
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

$X = QS + P'QR$

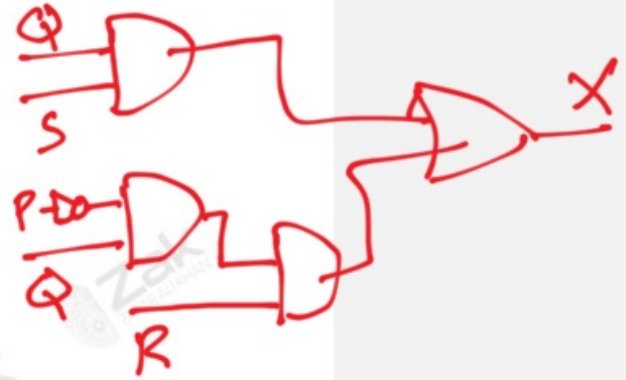
$\bar{P}Q\bar{R}S$ 0101 ✓

$\bar{P}QRS$ 0111 ✓

$P\bar{Q}\bar{R}S$ 0110 ✓

$P\bar{Q}RS$ 1101 ✓

$PQRS$ 1111



(i) Complete the K-map corresponding to the truth table above.

RS \ PQ	00	01	11	10
00				
01		1	1	
11		1	1	
10		1		

$\bar{P}Q\bar{R}S$, $\bar{P}QRS$, $PQRS$, $PQR\bar{S}$ → QS

$\bar{P}QRS$, $\bar{P}QR\bar{S}$ → $\bar{P}QR$

(ii) Draw loop(s) around appropriate groups of 1's to produce an optimal sum-of-products. [2]

(iii) Using your answer to **part (b)(ii)**, write the simplified sum-of-products Boolean function. [2]

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