

# Assignment

NAME: Bilal Haneef

ROLL #: 44

TEACHER: Miss Maleeha Anwar

TOPIC: K – Map

SECTION: SEC A (Evening)

PROGRAM: BSSE

Date: \_\_\_\_\_

Simplify the following expressions using K-map.

1)  $F(ABC) = \bar{A}BC + B\bar{C} + AB\bar{C} + A\bar{B}C$

*Solve*

$$F(ABC) = \bar{A}BC + B\bar{C} + AB\bar{C} + A\bar{B}C$$

Given expression is 3 variable expression,

$$2^n = 2^3 = 8$$

<del>A</del>	$\bar{B}\bar{C}$	$\bar{B}C$	$BC$	$B\bar{C}$
$\bar{A}$			1	1
A		1		1

$$F = B\bar{C} + \bar{A} \cdot (BC + B\bar{C}) + AB\bar{C}$$

$$= B\bar{C} + \bar{A}B(C + \bar{C}) + AB\bar{C} + (A + \bar{A})A\bar{C}$$

$$F = B\bar{C} + \bar{A}B + AB\bar{C}$$

2)  $F(ABC) = \bar{A}B\bar{C} + AB\bar{C} + ABC$

*Solve*

$$F(ABC) = \bar{A}B\bar{C} + AB\bar{C} + ABC$$

Given expression is 3 variable expression,

$$2^n = 2^3 = 8$$

<del>A</del>	$\bar{B}\bar{C}$	$\bar{B}C$	$BC$	$B\bar{C}$
$\bar{A}$				1
A			1	1

$$F = B\bar{C} + A \cdot (BC + B\bar{C})$$

$$= B\bar{C} + A \cdot B(C + \bar{C})$$

$$F = B\bar{C} + AB$$

$$3) F(ABCD) = \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}C\bar{D} + \bar{A}B\bar{C}\bar{D}$$

Soln

$$F(ABCD) = \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}C\bar{D} + \bar{A}B\bar{C}\bar{D}$$

Given expression is 4 variable expression,

$$2^n = 2^4 = 16$$

$\frac{A}{B} \backslash \frac{C}{D}$	$\bar{C}\bar{D}$	$\bar{C}D$	$CD$	$C\bar{D}$
$\bar{A}\bar{B}$	1			
$\bar{A}B$			1	
$A\bar{B}$	1		1	
$AB$		1		

$$F = (\bar{A}B + AB) \cdot CD + \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}C\bar{D}$$

$$F = B(\bar{A} + A)CD + \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}C\bar{D}$$

$$F = BCD + \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + A\bar{B}C\bar{D}$$

$$4) F(ABCD) = \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + \bar{A}B\bar{C}\bar{D} + A\bar{B}C\bar{D} + \bar{A}B\bar{C}D + A\bar{B}CD + A\bar{B}C\bar{D} + A\bar{B}CD$$

Soln

$$F(ABCD) = \bar{A}\bar{B}\bar{C}\bar{D} + A\bar{B}\bar{C}\bar{D} + \bar{A}B\bar{C}\bar{D} + A\bar{B}C\bar{D} + \bar{A}B\bar{C}D + A\bar{B}CD + A\bar{B}C\bar{D} + A\bar{B}CD$$

Given expression is 4 variable expression,

$$2^n = 2^4 = 16$$

$\frac{A}{B} \backslash \frac{C}{D}$	$\bar{C}\bar{D}$	$\bar{C}D$	$CD$	$C\bar{D}$
$\bar{A}\bar{B}$	1			
$\bar{A}B$		1	1	
$A\bar{B}$		1	1	1
$AB$	1		1	



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$$F = (\bar{A}B + AB)(\bar{C}D + CD) + (AB + A\bar{B}) \cdot CD + AB(CD + C\bar{D}) + \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D$$

$$F = B(\bar{A} + A)D(\bar{C} + C) + A(B + \bar{B}) \cdot CD + AB \cdot C(D + \bar{D}) + \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D$$

$$F = BD + BCD + ABC + \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D$$

5)  $F(ABCD) = \sum_m(4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)$

*Ans*

$$F(ABCD) = \sum_m(4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)$$

Given, problem is 4 variable problem,

$$2^n = 2^4 = 16$$

$\begin{matrix} CD \\ AB \end{matrix}$	$\bar{C}\bar{D}$	$\bar{C}D$	$CD$	$C\bar{D}$
$\bar{A}\bar{B}$	0	1	3	2
$\bar{A}B$	4	5	7	6
$AB$	12	13	15	14
$A\bar{B}$	8	9	11	10

$$F = (\bar{A}B + AB) + (AB + A\bar{B})$$

$$F = B(\bar{A} + A) + A(B + \bar{B})$$

$$F = B + A$$

$$F = A + B$$