Name: KEY Id#

COE 202, Term 132

Digital Logic Design

Quiz# 2

 Date: Tuesday, Feb. 25

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# **Q1.** Prove the identity of each of the following Boolean functions using algebraic manipulation. Start with the left-hand side expression and derive from it the right-hand side expression.

## $\overbar{a} \overbar{c}+a d+b \overbar{c} d=\overbar{a} \overbar{c}+a d$

A`C` + A D + B C` D = A`C` + A D + B C` D + C` D (by consensus between A`C` + A D)

= A`C` + A D + C` D (by absorption of B C` D in C` D)

= A`C` + A D (by consensus between A`C` + A D)

Another Solution:

A`C` + A D + B C` D = A`C` + A D + B C` D (A + A`)

= A`C` + A D + A B C` D + A` B C` D

= A`C` + A D ( by absorption of A B C` D in AD and absorption of A` B C` D in A` C`)

## $\overbar{( \overbar{a} [\overbar{c}+d]+c \left[\overbar{b} +\overbar{d} \right]+\overbar{c} \overbar{d} )}=a d (b+\overbar{c})$

= (a + c d`) (c` + b d) ( c +d) (by Demogan’s Law)

= (a c` + a b d) (c + d) (by distributive law)

= (a c` d + a b c d + a b d) (by distributive law)

= a c` d + a b d (by absorption of a b c d in a b d)

= a d ( c` + b) (by distributive law)

**Q2.** Given the Boolean functions $F\left(A, B,C\right)=\sum\_{}^{}m\left(0, 2, 4, 7\right)$ and $G\left(A, B,C\right)=\prod\_{}^{}M\left(0, 3, 5, 6\right)$.

## Give the *algebraic* sum of minterms expression for *F*.

$$F=\overbar{A} \overbar{B} \overbar{C}+\overbar{A} B \overbar{C}+A \overbar{B} \overbar{C}+A B C$$

## Express the function *G* as a sum of minterms, $G=\sum\_{}^{}m\left(…\right)$

$$G=\sum\_{}^{}m\left(1, 2, 4, 7\right)$$

## Express the function *F.G* as a sum of minterms, $F.G=\sum\_{}^{}m\left(…\right)$

$$F.G=\sum\_{}^{}m\left(2, 4, 7\right)$$

## Express the function *F+G* as a product of maxterms, $F+G=\prod\_{}^{}M\left(…\right)$

$$F+G=\sum\_{}^{}m\left(0, 1, 2, 4, 7\right)= \prod\_{}^{}M(3, 5, 6)$$