Name: KEY   **Id#**

COE 202, Term 142
Digital Logic Design

Quiz# 2

Date: Sunday, Feb. 22

Q1 Use Boolean algebra to solve the following questions. <u>Show clearly all your steps</u>.

a. Reduce $A` + AB + AC` + AB`C`$ to 3 literals

$= A` + AB + AC`$ (AB`C` is absorbed by AC`)

$= A` + AB + AC` + B$ (by consensus between A` and AB)

$= A` + AB + AC` + B + C`$ (by consensus between A` and AC`)

$= A` + B + C`$ (by Absorption; AB is absorbed by B and AC` is absorbed by C`)

b. Reduce $[(CD)` + A]` + AB + C`D + B`CD$ to 3 literals

$= A`CD + AB + C`D + B`CD$ (demorgan's law)

$= A`CD + AB + C`D + B`CD + BCD$ (by consensus between A`CD and AB)

$= A`CD + AB + C`D + CD (B` + B)$ (By distributive law)

$= A`CD + AB + C`D + CD$

$= A`CD + AB + D (C` + C)$ (By distributive law)

$= A`CD + AB + D$

$= AB + D$ (by Absorption; A`CD is absorbed by D)

Q2. Given the Boolean function $F(X,Y,Z) = (XY + Z)(\bar{X}\bar{Y} + \bar{Z})$:

a. Express F as a **product-of-Maxterms**, $F = \prod M$.

$F = XYZ` + X`Y`Z = \sum m(1,6) = \prod M (0, 2, 3, 4, 5, 7)$

OR

$F = (X + Z)(Y + Z)(X` + Z`)(Y` + Z`) = \prod M (0, 2, 3, 4, 5, 7)$

b. Find the **_algebraic_ sum-of-minterms** expression for F.

$F = \sum m(1,6) = X`Y`Z + XYZ`$