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Logic design (2018 fall)

Quiz # 3

Name:_____ID:_____

1. (50%) Reduce the following function to the minimum product of sums (three terms).

$$(W + X + Z)(W' + Y' + Z')(W + Y + Z)(W' + X + Y')$$

(W+X+Z)(W'+Y'+Z')(W+Y+Z)(W'+X+Y')

= ~~(W+X+Z)~~(W'+Y'+Z')(W+Y+Z)~~(W'+X+Y')~~(X+Y'+Z)

= (W'+Y'+Z')(W+Y+Z) (X+Y'+Z)

2. (50%) Determine the following equation is always valid or not with algebraic proof

$$(X' + Y')(X \equiv Z) + (X + Y)(X \oplus Y) = (X \oplus Y) + Z'$$

LHS: (X' + Y')(X ≡ Z) + (X + Y)(X ⊕ Y)

= (X' + Y')(X'Z' + XZ) + (X + Y)(X'Y + XY')

= X'Z' + ~~X'Y'Z'~~ + ~~XY'Z~~ + X'Y + XY'

= X'Z' + X'Y + XY'

RHS: (X ⊕ Y) + Z'

= Z' + X'Y + XY'

⇨ LHS ≠ RHS