0907231 Digital Logic (Fall 2009)

Quiz 1

الاسم: رقم التسجيل: رقم الشعبة: 2

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Instructions: Time **15** minutes. Closed books and notes. No calculators. **No questions are allowed**.

Q1. Convert 825_{10} to binary.

825 / 2 = 412 remainder 1
412 / 2 = 206 remainder 0
206 / 2 = 103 remainder 0
103 / 2 = 51 remainder 1
51 / 2 = 25 remainder 1
25 / 2 = 12 remainder 1
12 / 2 = 6 remainder 0
6 / 2 = 3 remainder 0
3 / 2 = 1 remainder 1
1 / 2 = 0 remainder 1

$825_{10} = 1100111001_2$

Q2. Convert 437.5_8 to hexadecimal.

```
      4    3    7.   5
000 100  011  111. 101 0
    1     1     F.    A
```

$437.5_8 = 11F.A_{16}$

Q3. Evaluate the following binary addition.

```
      1        1
   1 0 1 1 0 0 1
 + 0 0 1 0 1 0 1
 ===============
   1 1 0 1 1 1 0
```

Q4. Reduce the following Boolean expression to two literals.

$X + Y(Z + \overline{X + Z})$

$= X + Y(Z + \overline{X}\overline{Z})$ *DeMorgan's*

$= X + Y(Z + \overline{X})$ *Simplification*

$= X + YZ + Y\overline{X}$ *Distribution*

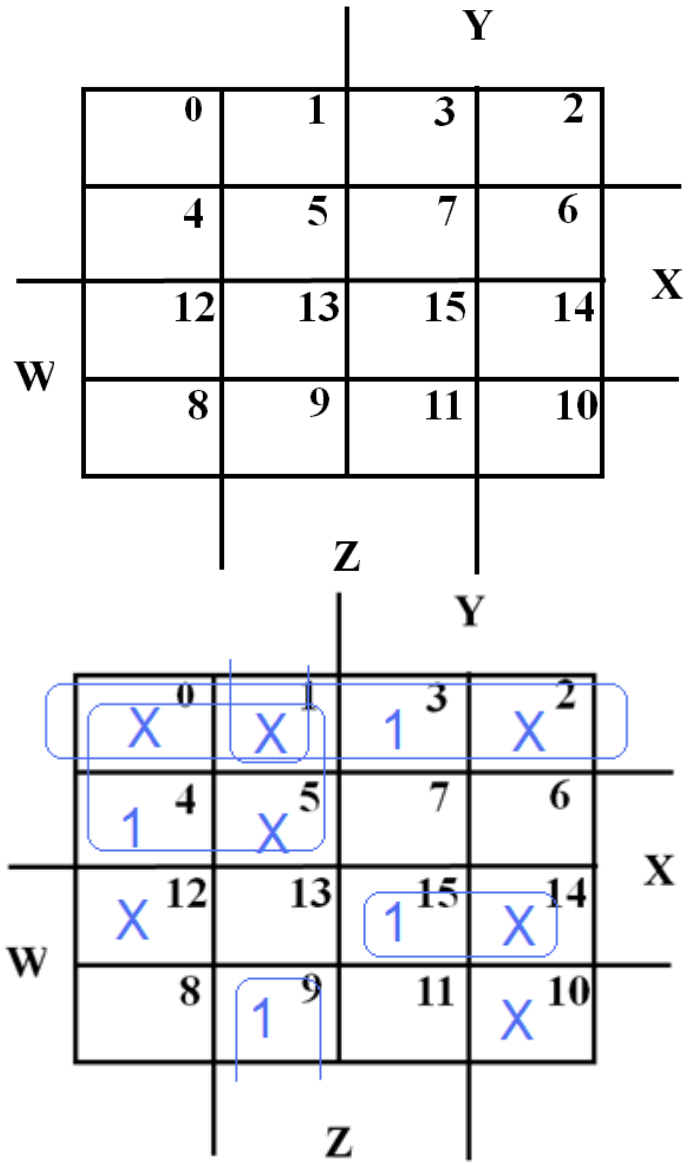
$= X + Y\overline{X} + YZ$ *Commutative*

$= X + Y + YZ$ *Simplification*

$= X + Y$ *Absorption*

Q5. Optimize the following Boolean function ***F*** together with the don't-care condition ***d*** in sum-of-products form.

F(W, X, Y, Z) = **Σ*m*(3, 4, 9, 15),** ***d(W, X, Y, Z)*** = **Σ*m*(0, 1, 2, 5, 10, 12, 14)**



F(W, X, Y, Z) = $\overline{W} \cdot \overline{X} + \overline{W} \cdot \overline{Y} + W \cdot X \cdot Y + \overline{X} \cdot \overline{Y} \cdot Z$

<Good Luck>