EE 2720, Spring 2012

Homework #2

Due Wednesday February 15, in class

Note: DO NOT do problem 5

EE 2720, Homework #2

Note: Please STAPLE your homework

Problem 1: Using the two's-complement system perform the addition of the 6-bit numbers X and Y where $X = 010100_2 = +20_{10}$ and $Y = 001111_2 = +15_{10}$. Do you have an overflow or underflow in this case? Justify your answer.

Problem 2: Using the two's-complement system perform the addition of the 6-bit numbers X and Y where $X = 101100_2 = -20_{10}$ and $Y = 110001_2 = -15_{10}$. Do you have an overflow or underflow in this case? Justify your answer.

Problem 3: Perform the addition X+Y where X and Y are the following 6-bit signed-magnitude numbers:

$X = 010100_2 = +20_{10}$ and $Y = 111110_2 = -30_{10}$.

Follow the same procedure as the one of the example on pages 23–24 of handout#3

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Problem 4: Perform the unsigned binary multiplication with multiplicand $X = 1101_2 = 13_{10}$ and multiplier $Y = 1110_2 = 14_{10}$.

Problem 5: Perform the signed two's complement binary multiplication with multiplicand $X = 1010_2 = -6_{10}$ and multiplier $Y = 1001_2 = -7_{10}$.

don't do prob. 5

Problem 6: Perform in BCD the addition

7+9

Problem 7: Perform in BCD the addition

5+4.

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Problem 8: Prove theorems (T1'), (T2'), (T3), (T3'), (T4), (T5') found in handout # 5.

Problem 9: Prove theorem (T7) of handout # 5 by using a truth table.

Problem 10: Prove theorem (T10') of handout # 5. You are not allowed to use a truth table.

Problem 11: Prove theorem (T13') of handout # 5 using the finite induction technique.

Problem 12: Prove the theorem that states $(X+Y)\cdot(X'+Z) = X\cdot Z + X'\cdot Y$. You are not allowed to use a truth table. **Hint:** Use theorem (T11).

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Problem 13: Prove that theorem (T10) is a special case of theorem (T11). Look at handout #5 for theorems (T10), (T11).

Problem 14: Use the theorems of switching algebra to simplify the following:

(a) $F = W \cdot X \cdot Y \cdot Z \cdot (W \cdot X \cdot Y \cdot Z' + W \cdot X' \cdot Y \cdot Z + W' \cdot X \cdot Y \cdot Z + W \cdot X \cdot Y' \cdot Z)$

(b) $F = A \cdot B + A \cdot B \cdot C' \cdot D + A \cdot B \cdot D \cdot E' + A \cdot B \cdot C' \cdot E + C' \cdot D \cdot E$