

EE 2720, Fall 2011

Homework # 2

Due Monday September 26, 2011, in class

Note: Don't do problem 5

EE 2720, Homework #2

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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 $X = 011001_2 = +25_{10}$ and $Y = 011011_2 = +27_{10}$.

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~~ 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: $X = 010101_2 = +21_{10}$ and $Y = 111111_2 = -31_{10}$. Follow the same procedure

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Problem 3 cont. as the one of the example on pages 23-24 of handout#3

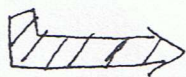
Problem 4: Perform the unsigned binary multiplication with multiplicand $X = 1100_2 = 12_{10}$ and multiplier $Y = 1111_2 = 15_{10}$.

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

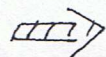
} don't do prob. 5

Problem 6: Perform ~~the addition~~ in BCD the addition $8+7$.

Problem 7: Perform in BCD the addition $3+4$.



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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:

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

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