

EE 2720, Spring 2011

Homework #2

Due @ wednesday february 16, 2011

in class

Enjoy your homework!

Alex

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  
 $X = 011101_2 = +29_{10}$  and  $Y = 011110_2 = +30_{10}$   
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  
 $X = 100011_2 = -29_{10}$  and  $Y = 110000_2 = -16_{10}$   
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:  
 $X = 011001_2 = +25_{10}$  and  $Y = 111110_2 = -30_{10}$

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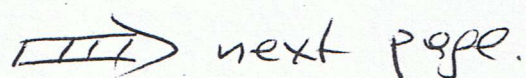
Problem 3 cont.: Follow the same procedure as the one of the example on pages 23-24 of handout #3.

Problem 4: Perform the unsigned binary multiplication with multiplicand  $X = 1110_2 = 14_{10}$  and multiplier  $Y = 1111_2 = 15_{10}$ .

Problem 5: Perform in BCD the addition  $9+8$ .

Problem 6: Perform in BCD the addition  $4+5$

Problem 7: Perform in BCD the addition  $5+5$

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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.

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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:

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

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