

King Fahd University of Petroleum and Minerals
 College of Computer Sciences and Engineering
 Department of Computer Engineering

COE 202 – Digital Logic Design (T112)

Homework # 04 (due date & time: Monday 09/04/2012 during class period)

*** Show all your work. No credit will be given if work is not shown! ***
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Problem # 1 (30 points): Find the decimal equivalent of the number $(100111.011)_2$ when the number is interpreted as:

- i. (10 points) Signed-magnitude number.
- ii. (10 points) 1's complement signed number.
- iii. (10 points) 2's complement signed number.

Problem # 2 (30 points):

(1) (18 points) If 7-bit registers are used, show the binary number representation of the decimal numbers (+47), (-47), (+23), and (-23) using the following representation systems:

	+47	-47	+23	-23
Signed magnitude system				
Signed 1's complement system				
Signed 2's complement system				

(2) (12 points) Using results from part (1) perform the following arithmetic operations using the indicated representation. For each case, state whether the result is +ive, -ive, or overflow.

- a. $47 - 23$ Using 1's complement representation
- b. $23 - 47$ Using 2's complement representation
- c. $-47 - 23$ Using 2's complement representation

Problem # 3 (10 points): Use a 4×16 non-inverted-output decoder and external gate(s) to implement the following function:

$$F(A, B, C, D) = \sum (1, 3, 6, 7, 8, 10, 14)$$

Problem # 4 (10 points): Repeat problem # 3 but use a 4×16 inverted-output decoder and external gate(s).

Problem # 5 (10 points): Repeat problem # 3 but use a 16×1 MUX and external gate(s).

Problem # 6 (10 points): Repeat problem # 3 but use an 8×1 MUX and external gate(s). Connect $C, A,$ and D to $S_2, S_1,$ and $S_0,$ respectively.