King Fahd University of Petroleum and Minerals
Department of Computer Engineering

DIGITAL LOGIC DESIGN COE 202

Exam 1, November 8, 2008

Problems	Grading
1	
2	
3	
TOTAL	

Student Name:……

Student ID:……

Problem-1: R's and (R-1)'s Complements and Conversions

Answer each of the following questions and show all your steps

1. Convert the following numbers from the given basis (radix)
    a. **$(323.25)_{10}$** to binary, octal and hexadecimal

    b. **$(10111101.101)_2$** to decimal, octal and hexadecimal

2. Find the Rs and(R-1)s complements of following numbers:
    a. The binary number **$(1101011010100101)_2$** has its
        i. Its 2's complement as:

        ii. Its 1's complement as:

    b. The octal number **$(36542)_8$** has its
        i. Its 8's complement as:

        ii. Its 7's complement as:

    c. The hexadecimal number **$(AB5612)_{16}$** has
        i. Its 16's complement as:

        ii. Its 15's complement as:

Problem-2: Addition and Subtraction using R's and (R-1)'s Complements

Perform the following subtractions using the specified representation. Also indicate weather the result is positive, negative or overflow:

d. Using 7's Complement, evaluate $\mathbf{(3567)_8 - (4573)_8 =}$

e. Using 16's Complement, evaluate $\mathbf{(357f6)_{16} - (12345)_{16} =}$

f. Using 1's Complement, evaluate $\mathbf{(11010011)_2 - (10101110)_2 =}$

g. Using 2's Complement, evaluate $\mathbf{(11010011.101)_2 - (10101110.1001)_2 =}$

Problem-3: Simplification of Boolean Expressions

Note: The notation used is as follows the Complement(X) = X' and Complement(XY) = (XY)'

Simplify the following Boolean expressions. **Show all your steps:**

1. XY + XYZ =

2. XZ + (X' + Z')Y =

3. XYZ + UV + (XYZ)'V =

4. (X + Y' + XY')' =

5. Evaluate the dual of (X + Y' + XY')' =