Name: KEY   **Id#**

ICS 233, Term 081

Computer Architecture & Assembly Language

Quiz# 4

Date: Saturday, Dec. 20, 2008

Q.1. Given that **Multiplicand=1011** and **Multiplier=1011**. Using the **refined signed multiplication** hardware, show the **signed** multiplication of **Multiplicand** by **Multiplier**. The result of the multiplication should be an 8 bit **signed** number in HI and LO registers. Show the steps of your work by filling the given table.

Iteration		Multiplicand	Sign	Product=HI,LO
0	Initialize (LO = Multiplier)	1011		0000 1011
1	LO[0] = 1 => ADD		1	1011 1011
	Shift Product = (HI, LO) right 1 bit	1011		1101 1101
2	LO[0] = 1 => ADD		1	1000 1101
	Shift Product = (HI, LO) right 1 bit	1011		1100 0110
3	LO[0] = 0 => Do Nothing		1	1100 0110
	Shift Product = (HI, LO) right 1 bit	0101		1110 0011
4	LO[0] = 1 => SUB (ADD 2's compl)		0	0011 0011
	Shift Product = (HI, LO) right 1 bit			**0001 1001**

Q.2. Given that **Dividend=1111** and **Divisor=0101**. Using the **refined unsigned division** hardware, show the **unsigned** division of **Dividend** by **Divisor**. The result of division should be stored in the Remainder and Quotient registers. Show the steps of your work by filling the given table.

Iteration		Remainder	Quotient	Divisor	Difference
0	Initialize	0000	1111	0101	
1	SLL, Difference	0001	1110	0101	1100
	Diff < 0 => Do Nothing	0001	111**0**		
2	SLL, Difference	0011	110**0**	0101	1110
	Diff < 0 => Do Nothing	0011	11**0**0		
3	SLL, Difference	0111	1**0**00	0101	0010
	Rem = Diff, set lsb Quotient	0010	1**00**1		
4	SLL, Difference	0101	**001**0	0101	0000
	Rem = Diff, set lsb Quotient	**0000**	**0011**		