Midterm Exam

(October 19th @ 7:30 pm)

Presentation and clarity are very important! Show your procedure!

Problem 1 (20 pts)

- Compute the result of the following operation with signed fixed-point numbers. For the division, use $x = 5$ fractional bits.

0.11010 + 1.010101	1.00111 - 1.000101	1.0001 + 101.001001
01.001 × 1.01101	1.011 × 1.01001	10.01010 ÷ 01.011

Problem 2 (30 pts)

- Calculate the result (as a 32-bit number) of the following operations with single floating point numbers. Truncate the results when required. When doing fixed-point division, use 4 fractional bits.

✓ 40B00000 + C2FA8000	✓ 10DAD000 – 90FAD000	✓ 7AB80000 × 81800000	✓ FA390000 ÷ 48400000

Problem 3 (20pts)

- Calculate the result of the following operations where the numbers are represented in dual fixed-point arithmetic. Note that the results must be in the same format. Include an overflow bit when necessary.

DFX Format 12_6_4	Result	Overflow		Result	overflow
F2A + 0A9			F99-092		
C00 + F13			F33-6A9		

Problem 4 (15 pts)

- Calculate the square root (in binary) of the following unsigned number. Use $x = 2$ extra precision bits for your answer.

$$Df = 1011.011001$$

Problem 5 (15 pts)

- Complete the following timing diagram of the following iterative unsigned multiplier ($N = 4, M = 4$).
  Register: $sclr$: synchronous clear. Here, if $sclr = E = 1$, the register contents are initialized to 0.
  Parallel access shift register: If $E = 1$: $s\_l = 1 \rightarrow$ Load, $s\_l = 0 \rightarrow$ Shift