Midterm Exam

(October 13th @ 7:30 pm)

Presentation and clarity are very important! Show your procedure!

Problem 1 (20 pts)

- Compute the result of the following operations. The operands are signed fixed-point numbers. The result must be a signed fixed point number. For the division, use $x = 5$ fractional bits.

1.0001 + 1.001001	1000.0101 - 1.010101	01.11111 + 0.00001
01.011 × 1.01101	1.001 × 1.0101	01.01110 ÷ 1.011

Problem 2 (30 pts)

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

✓ 42FA8000 + C0E00000	✓ 50DAD000 – D0FAD000	✓ 01800000 × FAB80000	✓ 7B390000 ÷ C8C00000

Problem 3 (15 pts)

- Convert the following signed fixed point numbers in format [12 8] to the dual fixed point format 12_8_4.

FX	A.CE	F.EE	C.0B	8.BF	1.0A
DFX					

Problem 4 (20 pts)

- 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
C0A + C2B			FB9-072		
2CD + 398			F33-CBF		

Problem 5 (15 pts)

- Complete the 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