Midterm Exam

(October 16th @ 5:30 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.

1.0111 + 1.101001	1.010101 − 1000.0101	01.11111 + 0.10001
10.101 × 1.01101	1.001 × 0.1011	10.1010 ÷ 0.101

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.

✓ C0D00000 + 42EA0000	✓ 50A90000 − 4F480000	✓ 80400000 × 7AB80000	✓ FB380000 ÷ 48C00000

Problem 3 (13 pts)

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

FX	A.D7	F.AE	7.1F	8.C4
DFX				

Problem 4 (22 pts)

- Calculate the result of the following operations where the numbers are represented in dual fixed-point arithmetic (12_8_4). Note that the results must be in the same format. Include an overflow bit when necessary.

DFX Format 12_8_4	Result	Overflow		Result	overflow
FAC + 7EE			10A-C0A		
40B + 78B			999-674		

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