Homework 2

(Due date: February 6th @ 7:30 pm)

Presentation and clarity are very important! Show your procedure!

PROBLEM 1 (15 PTS)

- Multiply the following signed fixed-point numbers (6 pts):

01.101 × 1.101001	100.001 × 01.10001	110.000 × 10.10101

- Get the division result (with $x = 4$ fractional bits) for the following signed fixed-point numbers:

101.0101 ÷ 1.101	10.0101 ÷ 01.11	1.1011 ÷ 1.01101

PROBLEM 2 (11 PTS)

- We want to represent numbers between -512 and 511.9997. What is the fixed point format that requires the fewest number of bits for a resolution better or equal than 0.0005? (4 pts).
- We want to represent numbers between -127.05 and 116.25. What is the fixed point format that requires the fewest number of bits for a resolution better or equal than 0.0015? (4 pts).
- Represent these numbers in Fixed Point Arithmetic (signed numbers). Select the minimum number of bits in each case.

-129.625	-69.1875	113.3125

PROBLEM 3 (10 PTS)

- Complete the table for the following fixed point formats (signed numbers): (4 pts)

Fractional bits	Integer Bits	FX Format	Range	Dynamic Range (dB)	Resolution
9	3				
11	5				
15	9				

- Complete the table for these floating point formats (which resemble the IEEE-754 standard). Only consider ordinary numbers.

Exponent bits (E)	Significant bits (p)	Min	Max	Range of e	Range of significand
8	6				
10	13				
15	32				

PROBLEM 4 (20 PTS)

- Calculate the decimal values of the following floating point numbers represented as hexadecimals. Show your procedure.

Single (32 bits)		Double (64 bits)	
✓ 90DBD800 ✓ 800BEEF0	✓ 7F85B0AC ✓ 70DECADE	✓ DECAFC0FFEE80000 ✓ 49A5DEAF8FAD8000	✓ ACCEDE90BEAD5000 ✓ 8009BEBEFACE8000

PROBLEM 5 (44 PTS)

- Calculate the result (provide the 32-bit result) of the following operations with 32-bit floating point numbers. Truncate the results when required. When doing fixed-point division, use 8 fractional bits. Show your procedure.

✓ 3DE38C80 + 3A80D980 ✓ 80123000 + 804E8000 ✓ 7FEEFCA0 + FACADE90	✓ 80A18000 – 83CEC000 ✓ 09DECAF0 – 7AD90000 ✓ F0B1ABEE – 7F800000	✓ 7A09D300 × 4D080000 ✓ 90DECADE × FF800000 ✓ 0B09A000 × 8FACC000	✓ 800C0000 ÷ 494C0000 ✓ 7F800000 ÷ 800ABBAA ✓ C9746000 ÷ 40490000