

# Homework 1

(Due date: September 20<sup>th</sup>)

Presentation and clarity are very important! Show your procedure!

## PROBLEM 1 (15 PTS)

- Calculate the result of the additions and subtractions for the following fixed-point numbers.

UNSIGNED		SIGNED	
1.101010 + 0.0111101	1.10011 - 0.0100101	10.001 + 1.001101	0.1101 - 1.0100101
11.1101 + 1.0001	100.1 + 0.1101101	1000.0101 - 101.01011	111.0001 + 1.0111101

## PROBLEM 2 (25 PTS)

- Multiply the following signed fixed-point numbers:

01.101 × 1.001101	10.1001 × 01.00101	1000.000 × 10.010011	0.1111010 × 10.0011011
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- Get the division result (with  $x = 4$  fractional bits) for the following signed fixed-point numbers:

101.1001 ÷ 1.0001	11.0101 ÷ 1.0101	10.0100 ÷ 01.11	0.1111010 ÷ 100.0111
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## PROBLEM 3 (20 PTS)

- We want to represent numbers between  $-511.97$  and  $256.25$ . What is the fixed point format that requires the fewest number of bits for a resolution better or equal than  $0.0025$ ? (5 pts).
- Represent these numbers in Fixed Point Arithmetic (signed numbers). Select the minimum number of bits in each case.

-127.125	-232.1875	-68.625	255.3125
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## PROBLEM 4 (10 PTS)

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

Fractional bits	Integer Bits	FX Format	Range	Dynamic Range (dB)	Resolution
8	4				
10	6				
16	8				

- Complete the table for the following floating point formats (which resemble the IEEE-754 standard) with 16, 24, 48 bits. Only consider ordinary numbers.

Exponent bits (E)	Significant bits (p)	Min	Max	Range of e	Range of significand
8	7				
10	13				
12	35				

## PROBLEM 5 (30 PTS)

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

Single (32 bits)		Double (64 bits)	
✓ 50DAD800	✓ 800FACEA	✓ FA09D3784D039B70	✓ 800CABADE049AB80
✓ 80BEEF80	✓ 7FC0FEE0	✓ 80BEEFACE9700400	✓ FE800CD009AB00D8
✓ 3DE32860	✓ FACEB00C	✓ 7FFDECADEFEEBEE9	✓ DFC0FC0FFEE10800