

Homework 1

(Due date: September 20th)

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

PROBLEM 2 (25 PTS)

- Multiply the following signed fixed-point numbers:

01.101 ×	10.1001 ×	1000.000 ×	0.1111010 ×
1.001101	01.00101	10.010011	10.0011011

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

101.1001 ÷	11.0101 ÷	10.0100 ÷	0.1111010 ÷
1.0001	1.0101	01.11	100.0111

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