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CS21
QUIZ 6

1. 5.75

CONVERT 5 TO BINARY

$5_{10} = 101_2$

CONVERT .75 TO BINARY

$.75 = .11$

$2^{-1}\ 2^{-2}$

$\boxed{5.75_{10} = 101.11_2}$

63/64

$.1\ \ 1\ \ 1\ \ 1\ \ 1\ \ 1$

$1/2\ \ 1/4\ \ 1/8\ \ 1/16\ \ 1/32\ \ 1/64$

$\frac{32}{64} + \frac{16}{64} + \frac{8}{64} + \frac{4}{64} + \frac{2}{64} + \frac{1}{64} = \frac{63}{64}$

$\boxed{63/64_{10} = .111111_2}$

9.8125

CONVERT 9_{10} TO BINARY

$9_{10} = 1001_2$

CONVERT .8125 TO BINARY

$.1\ \ 1\ \ 0\ \ 1$

$2^{-1}\ 2^{-2}\ 2^{-3}\ 2^{-4}$

.8125
.5
.3125
-.25
.0625
-.0625
0

$\boxed{9.8125 = 1001.1101_2}$

2. 34.890625 SIGN = + = 0

CONVERT 34_{10} TO BINARY

1 0 0 0 1 0
32 16 8 4 2 1

CONVERT $.890625_{10}$ TO BINARY

. 1 1 1 0 0 1
.5 .25 .125 .0625 .03125 .015625

$.890625$
$-.5$
$.390625$
$-.25$
$.140625$
$-.125$
$.015625$
$-.015625$
0

100010.111001 SHIFT TO LEFT MOST 1

1.00010111001×2^5 UNBIASED EXP = 5

BIASED EXPONENT = $5 + 127 = 133_{10} =$ 1 0 0 0 0 1 0 1
128 64 32 16 8 4 2 1

0	1 0 0 0 0 1 0 1	0000 0000 0000 0001 0111 001
SIGN 1 BIT	EXPONENT 8 BITS	MANTISSA 23 BITS

3. SIGN = 0 = +

BIASED EXPONENT = $01111011_2 = 64+32+16+8+2+1 = 123_{10}$
128 64 32 16 8 4 2 1

UNBIASED = $123_{10} - 127_{10} = -4$

$1.0 \times 2^{-4} = 0.0001 = \boxed{0.0625}$
.5 .25 .125 .0625

4. A DENORMALIZED NUMBER HAS ZERO FOR THE EXPONENT, BUT A NONZERO MANTISSA. A DENORMALIZED STARTS WITH ZERO INSTEAD OF A ONE FOR NORMALIZED.

LARGEST DENORMALIZED NUMBER

0 00000 1111111111 $= 0.1111111111_2 \times 2^{-14}$

SMALLEST NORMALIZED NUMBER

0 00001 0000000000 $= 1.0_2 \times 2^{-14}$