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CS 200 Homework 5

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1. a. 43.46875 sub 10 to base 2  
     
   43.46875 -32=11 1

11.46875 <16 0

11.46875 -8=3 1

3.46875 <4 0

3.46875 -2=1 1

1.46875 -1=.46875 1

.46875<.5 0

.46875-.25=.21875 1

.21875-.125=.09375 1

.09375-.0625=.03125 1

.03125-.03125=0 1

Result =101011.01111 sub 2

b. 11011011.010101 sub 2 to base 10

=1\*(2^7)+1\*(2^6)+0\*(2^5)+1\*(2^4)+1\*(2^3)+0\*(2^2)+1\*(2^1)+1\*(2^0)+0\*(2^-1)+1\*(2^-2)+0\*(2^-3)+1\*(2^-4)+0\*(2^-5)+1\*(2^-6)

=128+64+0+16+8+0+2+1+0+.25+0+.0625+0+.015625

=219.328125

c. 241.35 sub 7 to base 10

=2\*(7^2)+4\*(7^1)+1\*(7^0)+3\*(7^-1)+5\*(7^-2)

=98+28+1+0.4285714285714286+0.1020408163265306

=98+28+1+(3/7)+(5/49)

=127+(26/49)

=

1. “-27.8125” to floating point representation  
   27= 11011

.8125\*2=1.625 1

.625\*2=1.25 1

.25\*2=.5 0

.5\*2=1 1

So 27.8125 = 11011.1101 \* (2^0) = 1.10111101 \* (2^4) (Decimal moved 4 left)

127+4=132

132=10000011

32 total bits-1 sign bit-8 bit exponent= 23 needed bits

|  |  |  |
| --- | --- | --- |
| 1 | 10000011 | 10111101000000000000000 |

Exponent with a bias of 127. 8-bits.

Sign Bit

0 positive

1 negative

23-bit number with 1 implied to the left of the radix point. In our case: 🡪1🡨.1.0111101