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CDA 3101

Homework 1

I have neither given nor received any unauthorized aid on this assignment

1) $-2019_{16} \rightarrow 9 \cdot 16^0 + 1 \cdot 16^1 + 0 \cdot 16^2 + 2 \cdot 16^3 = -8217_{10}$

$8217 \% 2 = 1, 8217/2 = 4108 \quad -8217_{10} =$

$4108 \% 2 = 0, 4108/2 = 2054$

$2054 \% 2 = 0, 2054/2 = 1027$

$1027 \% 2 = 1, 1027/2 = 513$

$513 \% 2 = 1, 513/2 = 256$

$256 \% 2 = 0, 256/2 = 128$

$128 \% 2 = 0, 128/2 = 64$

$64 \% 2 = 0, 64/2 = 32$

$32 \% 2 = 0, 32/2 = 16$

$16 \% 2 = 0, 16/2 = 8$

$8 \% 2 = 0, 8/2 = 4$

$4 \% 2 = 0, 4/2 = 2$

$\uparrow 2 \% 2 = 0, 2/2 = 1$

$\uparrow 1 \% 2 = 1, 1/2 = 0$

$-8217_{10} = 10000000011001_2$

a) 110111111100111

b) 110111111100110

c) 1010000000011001

2) 1010 0111 1011 1100₂

a) unsigned int: 42940

b) sign-magnitude: -10172

c) two's complement: 0101100001000100 = 22596

d) one's complement: 0101100001000011 = 22595

3) 1100 0010 1001 0010 0100 1001 0010 0100₂

sign: negative

exponent: $133 - 127 = 6$

mantissa: 1.001001001001001001001

$$\hookrightarrow = 2^0 + 2^{-3} + 2^{-6} + 2^{-9} + 2^{-12} + 2^{-15} + 2^{-18} + 2^{-21} = 1.14286$$

$$\text{answer: } -2^6 \cdot 1.14286 = -73.14285$$

4) $X = \overline{A} \cdot (\overline{B} + C) + \overline{(C + A)}$

$$= (\overline{A} \cdot \overline{B}) + (\overline{A} \cdot C) + \overline{(C + A)}$$

$$= (\overline{A} \cdot \overline{B}) + (\overline{A} \cdot C) + (\overline{C} \cdot \overline{A})$$

$$= (\overline{A})(\overline{B}) + (\overline{A})(C + \overline{C})$$

\hookrightarrow always true so it equals 1

$$= (\overline{A})(\overline{B}) + (\overline{A})$$

$$= (\overline{A} + \overline{A}) \cdot (\overline{B} + \overline{A})$$

$$X = \overline{(A \cdot A)} \cdot \overline{(B \cdot A)}$$

truth table for $X = \overline{(A \cdot A)} \cdot \overline{(B \cdot A)}$

A	B	$\overline{(A \cdot A)}$	$\overline{(B \cdot A)}$	X
0	0	1	1	1
0	1	1	1	1
1	0	0	1	0
1	1	0	0	0

Circuit

