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ECE-361

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HW1 Q1,Q2

Q1.

A. $a \ 2^{24} - 1 = 16,777,215$

b $2^{23} - 1 = 8,388,607$

c $2^{23} - 1 = 8,388,607$

B. $a \ 2^9 - 1 = 511$

b $2^9 = 512$

c 1

C. $2^{20} = 2^{10} * 2^{10}, 2^{10} = 1024$ (From memory)

Using exponent rules:

$$1024^2 = (1000 * 1024) + (0 * 1024) + (20 * 1024) + (4 * 1024)$$

$$1024^2 = 1024000 + 0 + 20480 + 4096 = 1044480 + 4096 = 1048576$$

$$2^{20} = 1048576$$

Q2.

A. $a \ 0xB5 = (11 * 16) + 5 = 181 = 2^7 + 2^5 + 2^4 + 2^2 + 2^0 = 10110101$

b $0x5B = (5 * 16) + 11 = 91 = 01011011$ (Flipped the 2 nibbles from Q2a)

c $0xFFFF = 1111 \ 1111 \ 1111 \ 1111$ ($F = 1111$)

d $0xD = 13 = 0111$

$$0xD0000000 = 0111 \ 0000 \ 0000 \ 0000 \ 0000 \ 0000 \ 0000 \ 0000$$

B. $a \ 48 = 2^5 + 2^4 = 00110000$

b $-59 = -2^7 + 2^6 + 2^2 + 2^0 = 1100 \ 0101$

c Out of range, 8-bit 2's complement can only support values up to +127

d Out of range, 8-bit 2's complement can only support values down to -128

C. a 10011001

+ 01000100

= $1101 \ 1101$ No overflow no carry

b $1101 \ 0010$

+ $1011 \ 0110$

= $1 \ 1000 \ 1000$ Carry but no overflow