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CSCI 360

Summer 2021

6/21/21

1. Convert the following unsigned binary numbers to their decimal representations: (8 points)

a. 110 1x2^2+1\*2^1+0\*2^0

6

b. 1101 1x2^3+1\*2^2+0\*2^1+1\*2^0

7

c. 1101011 1x2^6+1\*2^5+0\*2^4+1\*2^3+0\*2^2+1\*2^1+1\*2^0

107

d. 0101 1x2^2+0\*2^1+1\*2^0

5

2. Convert the following unsigned hexadecimal numbers to their decimal representations: (8 points)

a. 14 1\*16^1+4\*16^0

20

b. C1 12\*16^1+1\*16^0

193

c. CE9 12\*16^2+14\*16^1+9\*16^0

3305

d. B19 11\*16^2+1\*16^1+9\*16^0

2841

3. Convert the following unsigned decimal numbers to both hex and binary representations: (8 points)

a. 14

HEX:E

BIN:1110 14/2 7/2 = 1 3/2 = 1 1/2 = 1

b. 456

HEX:1C8 456/16 = 8 28/16 = 12 = C 1/16 = 1

BIN:111001000 456/2 228/2 114/2 57/2 = 1 28/2 14/2 7/2 = 1 3/2 = 1 1/2 = 1

c. 48

HEX:30 48/16 = 0 3/16 = 3

BIN:110000 48/2 24/2 12/2 6/2 3/2 = 1 1/2 = 1

d. 4095

HEX:FFF 4095/16 = 15 = F 225/16 = 15 = F 15/16 = 15 = F

BIN:111111111111 4095/2 = 1 2047/2 = 1 1023/2 = 1 511/2 = 1 255/2 = 1 127/2 = 1 63/2 = 1 31/2 = 1 15/2 = 1 7/2 3/2 = 1 1/2 = 1

4. Do the following unsigned binary arithmetic giving the answer in binary: (8 points)

111

a. 10110

+ 01101

100011

1

b. 11001

+00101

11110

12 2

02002

c. 10110

-01111

111

d. 11111

-01101

10010

5. Do the following unsigned hexadecimal arithmetic giving the answer in hexadecimal: (8 points)

1

a. 829D

+ 1A82

9D1F

1

b. E2C

+A32

185E

916

c. FA28

–3254

C7D4

D16

d. E2C

-AB1

37B

6. Do the following arithmetic as if these were five-bit signed representations and indicate if overflow occurs and, if so, why.

Note: Remember that you want to add. So, for signed subtraction, always convert the subtrahend (the number being subtracted) to its 2's complement and add it.

Do this whether or not the subtrahend is negative OR positive and still check for overflow! (8 points)

11

a. 10110

+ 01101

00011

NO OVERFLOW

00

b. 11001

+00101

11110

NO OVERFLOW

10

c. 10110

+10011 (subtrahend)

01001

OVERFLOW

11

d. 11111

+ 10101 (subtrahend)

10100

NO OVERFLOW

7. Assume that

Register 0 contains 0007F144  
Register 1 contains 00000128  
Register 7 contains EC0735C8  
Register 9 contains 00000C22

If they are valid, calculate the absolute D(X,B) addresses for the representations below. If they are not valid, explain why. (12 points)

1

a. 56(,1) Yes 128  
 + 38

160

b. 0(0,1,7) No not D(X,B) syntax error

c. 6(7,0) Yes 735C8

+ 6  
 735CE

d. 12(9) Yes C22

+ C

C2E

e. 255(9,1) Yes 128

+C22

D4A

+ FF

E49

f. 11(1,7)Yes 1

735C8

+ 128

736F0

+ B

736FB