CSCE 211 PROBLEM ASSIGNMENT 1 SEP 01. 2025

You must show all your work! Answers without supporting work will not be given credit. Write answers in spaces provided. Illegible work falls under the *Intended Purpose* policy.

You must upload any digital submission as a SINGLE PDF DOCUMENT. Multiple file submissions or files of any other type will not be accepted.

This assignment is worth 10/60 ($\approx 9.5\%$) of Problem Assignment points

Name:_____

1. Convert the following as indicated: (2 points)

   (a) 00101001_2 to a decimal integer,

$1_{10} \times 2_{10}^{5} + 1_{10} \times 2_{10}^{3} + 1_{10} \times 2_{10}^{0} = 32 + 8 + 1$

Answer: 41 10

(b) 00101100_2 to a hexadecimal integer,

2_{16} 12_{10}

C_{16}

Answer: $2C_{16}$

(c) $B1_{16}$ to an 8-bit unsigned binary integer, and

$B = 11$

Answer: 10110001_2

Cont.

(d) 212_{10} to an 8-bit unsigned binary integer.

106 r 0
2 | 212

53 r 0
2 | 106

26 r 1
2 | 53

13 r 0
2 | 26

6 r 1
2 | 13

3 r 0
2 | 6

1 r 1
2 | 3

0 r 1
2 | 1

Answer: 1101 0100$_2$

2. Compute the **4-bit binary** sum of the following 4-bit unsigned binary integers. Provide the base-10 result as well. Do allow values to overflow—that is do not add bits in excess of the 4 bits. Additionally, provide decimal(base$_{10}$) integer values [1]: (2 points)

(a) 0011 + 0111

3_{10} 7_{10}

```
 1 1 1
  0 0 1 1
+ 0 1 1 1
---------
  1 0 1 0
```

Answer: 1010$_2$

Answer: 10$_{10}$

(b) 1010 + 0111

10_{10} 7_{10}

```
   1 1
  1 0 1 0
+ 0 1 1 1
---------
  0 0 0 1
```

Answer: 0001$_2$

Answer: 1$_{10}$

[1] Take into account overflow. Do not tell me that $15_{10} + 15_{10} = 30_{10}$. I know you know that. Due to overflow in 4-bit, $15_{10} + 15_{10} = 14_{10}$. i.e., at least 5-bits are necessary to count above 15.

Cont.

3. Convert the following to **8-bit two's complement-encoded binary** integers and perform the indicated operations. You must show all conversions into and out of two's complement encoding. Provide your results in 8-bit two's complement binary and base-10 or base-16, based on problems' radii. (2 points)

(a) $27_{10} - 15_{10} = 27 + (-15)$

$-15_{10} = 0000\ 1111$

$$\begin{array}{r} 1\ 1\ 1\ 1\ 1\ 1\ 1 \\ 1111\ 0001 \\ 0000\ 1111 \\ \hline 0000\ 0000 \end{array}$$

$27_{10} = 0001\ 1011$

$$\begin{array}{r} 1\ 1\ 1 \quad 1\ 1 \\ 0001\ 1011 \\ 1111\ 0001 \\ \hline 0001\ 1100 \end{array}$$

Answer: 0001 1100 (2)

Cont.

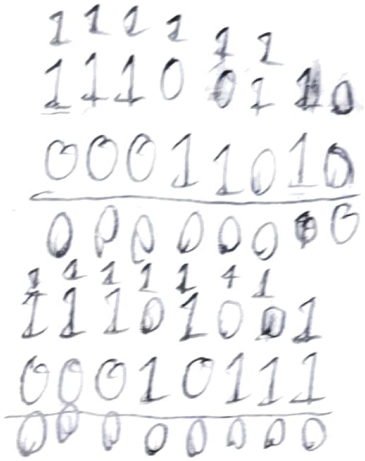
Answer: 12 10

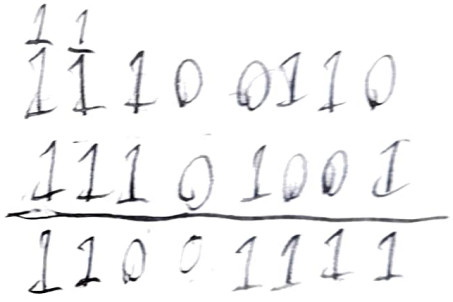
0006 1200
8421

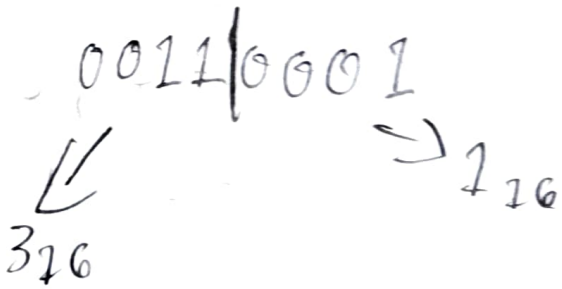
(b) $-17_{16} - 1A_{16}$ = $-17_{16} + (-1A_{16})$

$-1A_{16} = -00011010_2$

$-17_{16} = -00010111_2$





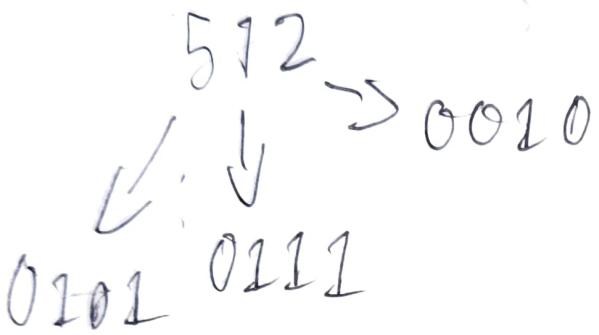


Answer: 1100 1111 $_2$

Answer: -31 $_{16}$

1. For each of the following, show their conversion to binary coded decimals (BCD) as 8421-code: (2 points

(a) 572_{10}



Answer: 0101 0111 0010

(b) 213_4

$2 \cdot 4^2 + 1 \cdot 4^1 + 3 \cdot 4^0 = 32 + 4 + 3 = 39_{10}$

0011 1001

Answer: 0011 1001

Cont.

5. Decode the two following 8-bit binary **strings** into ASCII characters[2]: (2 points)

   (a) 01100011 01010011 01000011 01100101

0110 0011 0101 0011 0100 0011 0110 0101
c S C e

Answer: cSCe

   (b) 01100011 01100011 00111110 01101010 01100001 01110110 01100001
c c > j a v a

Answer: cc>java

[2]You may use the 7-bit ASCII from the book, but do keep in mind ASCII values, like all values in a computer, are at least 8-bits in size. Simply add a 0 as the most significant bit of each character from the book.

The End.