CSA T1 - Numbering Systems

October 17, 2019

1. Convert the following to decimal numbers.
   (a) 11100111_2
      i. 231
   (b) 5577_8
      i. 2943
   (c) ABCD (Hexadecimal)
      i. 43981
2. Convert the followings to Base-2, Base-8 and Base-16 respectively.
   (a) 3064 D
      i. Base 2: $1011\,1111\,1000_2$
      ii. Base 8: 5770_8
      iii. Base 16: $BF8_{16}$
   (b) 2016_{10}
      i. Base 2: $111\,1110\,0000_2$
      ii. Base 8: 3740_8
      iii. Base 16: $7E0_{16}$
   (c) 2899 base-10
      i. Base 2: $1011\,0101\,0011_2$
      ii. Base 8: 5523_8
      iii. Base 16: $B53_{16}$
3. Convert the following numbers to the respective base.
   (a) 1111101000111100_2 to base-8 and base-16 respectively
      i. Base 8: 175074_8
      ii. Base 16: $FA3C_{16}$
   (b) 1100001110100101_2 to base-8 and base-16 respectively
      i. Base 8: 141645_8

ii. Base 16: $C3A5_{16}$

(c) $1EF_H$ to base-2 and base-8 respectively

i. Base 2: $0001\,1110\,1111_2$

ii. Base 8: 0757_8

(d) $257AC_H$ to base-2 and base-8 respectively

i. Base 2: $10\,0101\,0111\,1010\,1100_2$

ii. Base 8: 453654_8

(e) 754_8 to base-16

i. Base 16: $1EC_{16}$

(f) $447_{16}$to base-8

i. Base 8: 2107_{16}

4. Perform the following conversions. You are required to **show the working steps clearly**. If the operation(s) is illogical, explain the reason.

(a) 1658_{10} to hexadecimal number

i. $67A_{16}$

(b) 765_8 to hexadecimal number

i. $1F5$

(c) 67324_7 to decimal number

i. Illogical, only 1-6

(d) 87390_{10} to base-5 number

i. 10244030

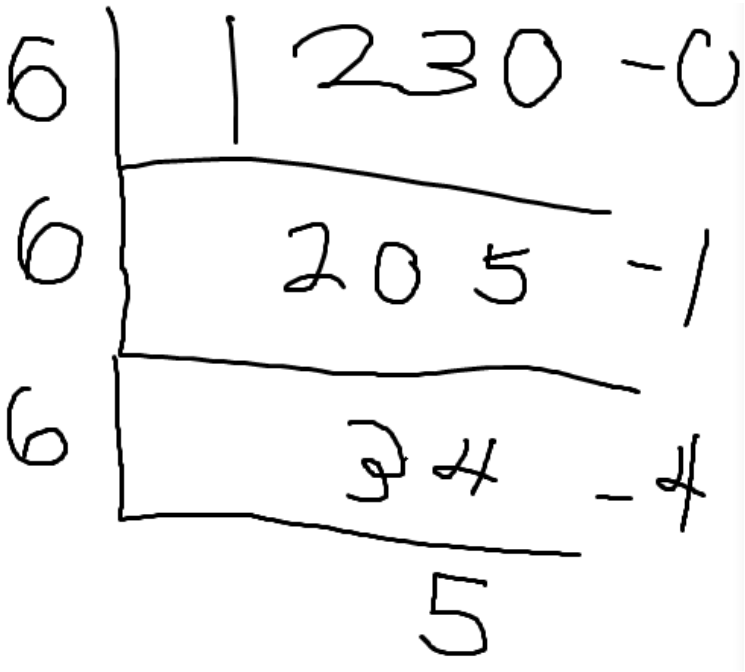
(e) 39208_8 to decimal number

i. Illogical, base 8 does not include 8.

5. Perform the following conversions. You are required to show the working steps clearly. If the operation(s) is illogical, explain the reason.

(a) 1230_{10} to base-6 number

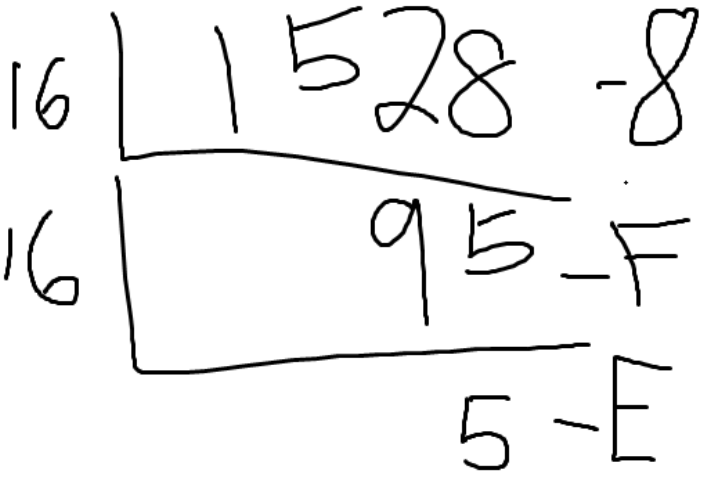
i. Convert using the "continuous division method"



ii.

iii. 5410_6

(b) 1528_{10} to hexadecimal number



i.

ii. Hexadecimal form: $5F8_{16}$

(c) 6217_8 to decimal number

$$6 * 8^3 + 2 * 8^2 + 1 * 8^1 + 7 * 8^0 = 3215_{10}$$

(d) $372_8$to hex

i. $0FA_{16}$

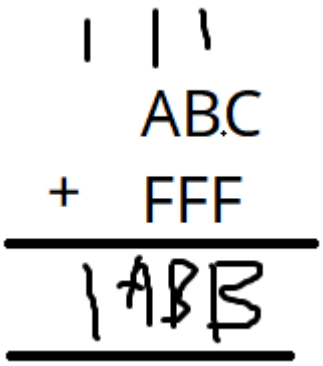
(e) 230_{10} to base-7 number (use the method in 2a, but substitute the 16 for 7. Drawing is tiring lol.)

$$230_{10} = 446_7$$

6. Perform the following operations and show the answers in the respective number base. You are required to show your working steps clearly

(a) $ABC_{16} + FFF_{16}$

i.



(b) $125_8 - 77_8$

i. 26_8

(c) $1011_2 * 101_2$

i. 110111_2

(d) $11011_2 * 101_2$

i. 10000111_2

(e) $11011_2 * 1011_2$

i. 100101001_2

7. Perform the following operations and show the answers in the respective number base. You are required to show your working steps clearly

(a) $461_8 + 515_8$

$$461_8 + 515_8 = 1176_8$$

(b) $224_7 - 136_7 = 55_7$

(c) $173_H * AA_H = 371 * 170 = 63070 = F65E$

(d) $11111010_2 + 1110_8 = 372_8 + 1110_8$

i. Note: Direct conversion, split into parts of 3 from the right, if insufficient, pad in front. For fractions, from left.

(e) $3064_{16} * 213_8$

i. Use binary as a pit stop for easy conversion. Octal is sets of 3, Hex is sets of 4.

$$213_8 = 10001011_2$$

ii. $1A464C_{16}$