Conversions

Convert the following numbers to their representatives in base 2, 16, & 10.

$0110\ 0100_2$

$= \boxed{64_{16}}$ binary *is* hex

$= 6 \times 16 + 4 \times 1$

$= \boxed{100_{10}}$

47_{16}

$= \boxed{0100\ 0111_2}$ binary *is* hex

$= 4 \times 16 + 7 \times 1$

$= \boxed{71_{10}}$

47_{10}

$47 \div 16 = \boxed{2}\ R15$

$15 \div 1 = \boxed{15}\ R0$

$= \boxed{2F_{16}}$

$= \boxed{0010\ 1111_2}$ binary *is* hex

$1010\ 1010\ 1010_2$

$= \boxed{AAA_{16}}$ binary *is* hex

$= 2560 + 160 + 10$

$= \boxed{2730_{10}}$

$7E3_{16}$

$= \boxed{0111\ 1110\ 0011_2}$ binary *is* hex

$= 7 \times 256 + 14 \times 16 + 3 \times 1$

$= 1792 + 224 + 3$

$= \boxed{2019_{10}}$

999_{10}

$999 \div 256 = \boxed{3}\ R231$

$231 \div 16 = \boxed{14}\ R7$

$7 \div 1 = \boxed{7}\ R0$

$= \boxed{3E7_{16}}$

$= \boxed{0011\ 1110\ 0111_2}$

1800_{10}

$1800 \div 256 = \boxed{7}\ R8$

$8 \div 16 = \boxed{0}\ R8$

$8 \div 1 = \boxed{8}\ R0$

$= \boxed{708_{16}}$

$= \boxed{0111\ 0000\ 1000_2}$ binary *is* hex

$1111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111_2$

$= 2^{32} - 1 = \boxed{4,294,967,295}$

Bonus

Calculate the date that a fixed-point, 32-bit, 2's-complement number of seconds will not be enough to count the seconds from midnight 1970/01/01. (When is 2^{31} seconds from mindight 1970/01/01?)

$$2^{31} \div 60 \div 60 \div 24 \div 365.25 + 1970 \approx \boxed{2038.05}$$

Since... $0.05 \times 365.25 \approx 18$

The fixed-point, 32-bit, 2's-complement number of seconds will overflow on 2038/01/19 (the so-called *Year 2038 Problem*).

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