

ANSWER KEY

HW2: Number Systems

1. Base Conversions:

a. $(110111001)_2 \rightarrow (?)_{16}$

$$\begin{array}{ccc} 0001 & 1011 & 1001 \\ \downarrow & \downarrow & \downarrow \\ 1 & B & 9 \end{array} = \boxed{(1B9)_{16}}$$

b. $(3701)_8 \rightarrow (?)_2$

$$\begin{array}{cccc} 3 & 7 & 0 & 1 \\ \hline (011 & 111 & 000 & 001)_2 \end{array}$$

c. $(3AC7)_{16} \rightarrow (?)_{10}$

$$3(16^3) + 10(16^2) + 12(16^1) + 7(16^0) = \boxed{(15047)_{10}}$$

d. $(110111001)_2 \rightarrow (?)_{10}$

$$1(2^8) + 1(2^7) + 1(2^5) + 1(2^4) + 1(2^3) + 1(2^0) = \boxed{(441)_{10}}$$

2. Perform binary addition for the following: $(10101110)_2 + (1101101)_2$

$$\begin{array}{r} 11 \\ + 10101110 \\ 01101101 \\ \hline \boxed{100011011} \end{array}$$

note:
 $1+1 = 10$
 $1+1+1 = 11$

3. Convert each decimal value into binary and perform binary addition: $(43)_{10} + (18)_{10} + (27)_{10}$

$43/2 = 21$	R	$18/2 = 9$	R	$27/2 = 13$	R	$\begin{array}{r} 11101 \\ 101011 \\ 10010 \\ + 11011 \\ \hline \boxed{1011000} \end{array}$
$21/2 = 10$	1	$9/2 = 4$	1	$13/2 = 6$	1	
$10/2 = 5$	0	$4/2 = 2$	0	$6/2 = 3$	0	
$5/2 = 2$	1	$2/2 = 1$	0	$3/2 = 1$	1	
$2/2 = 1$	0	$1/2 = 0$	1	$1/2 = 0$	1	
$1/2 = 0$	1					

