

## Number Systems Review

**Show all work** for all questions unless otherwise noted.

1. Convert as indicated:

a)  $1101_2$  to decimal

$$8+4+1 = 13_{10}$$

c)  $37_{10}$  to binary

$$100101_2$$

e)  $11110010_2$  to hexadecimal

$$F2_{16}$$

g)  $1001110011110010_2$  to hexadecimal

$$9CF2_{16}$$

i)  $ACED_{16}$  to octal

$$\text{to binary: } 1010110011101101_2$$

$$\text{to octal: } 126355_8$$

k)  $1010.0011_2$  to decimal

$$10.1875_{10}$$

m)  $4.9_{10}$  to binary

$$100.1\overline{1100}_{10}$$

b)  $1111010_2$  to decimal

$$64+32+16+8+2 = 122_{10}$$

d)  $243_{10}$  to binary

$$11110011_2$$

f)  $11101010_2$  to octal

$$352_8$$

h)  $BE3C_{16}$  to binary

$$1011111000111100_2$$

j)  $111.1011_2$  to decimal

$$7.6875_{10}$$

l)  $14.125$  to binary

$$1110.001_2$$

n)  $7.75_{10}$  to binary

$$111.11_{10}$$

2. Complete the table below. No need to show work.

Binary	Octal	Decimal	Hexadecimal
<b>1001001101110</b>	11156	4718	126E
11000100	<b>304</b>	196	C4
1011011	133	<b>91</b>	5B
110000001011	6013	3083	<b>C0B</b>

3. Perform the following tabular addition:

a) **Binary**  

$$\begin{array}{r} 1100111 \\ +0110110 \\ \hline \end{array}$$

**$10011101_2$**

b) **Hex**  

$$\begin{array}{r} 4E23 \\ + \underline{5542} \\ \hline \end{array}$$

**$A365_{16}$**

c)  $1001101_2 + 0010010_2$

**$1011111_2$**

d)  $1000111_2 + 10110_2 + 10111_2$

**$1110100_2$**

e)  $437_8 + 4AF_{16}$

**$10111001110_2$   
 $2716_8$   
 $5CE_{16}$**

f)  $F2A3_{16} + 10011010_2 + 342_8$

**$1111010000011111_2$   
 $172037_8$   
 $F41F_{16}$**

4. Subtract each pair of numbers below using the indicated method by:

(i) first converting the numbers to binary  
 (iii) determining the answer

(ii) making appropriate conversions  
 (iv) checking your result

a)  $14 - 34$

**$00010100 = -20$**

b)  $29 - 22$

**$00000111 = +7$**

c)  $16 - 46$

**$00011110 = -30$**

d)  $37 - 30$

**$00000111 = +7$**

e)  $-70 + 58$

**$00001100 = -12$**

f)  $88 - 68$

**$00010100 = +20$**

a)  $14 - 34$

Set -34

$$00100010 \rightarrow 11011101 + 1 \rightarrow 11011110$$

$$\begin{array}{r} 00001110 \\ + 11011110 \\ \hline \end{array}$$

$$\textcircled{0}1101100 \rightarrow \text{convert.}$$

neg.

$$00010011 + 1$$

$$10100 = \textcircled{-20}$$

b)  $29 - 22$

Set -22

$$00010110 \rightarrow 11101001 + 1 = 11101010$$

$$\begin{array}{r} 00011101 \\ + 11101010 \\ \hline \end{array}$$

$$\textcircled{0}0000111 = \textcircled{7}$$

c)  $16 - 46$

Set -46

$$00101110 \rightarrow 11010001 + 1 \rightarrow 11010010$$

$$\begin{array}{r} 00010000 \\ + 11010010 \\ \hline \end{array}$$

$$\textcircled{0}1100010 \rightarrow 00011101 + 1 \rightarrow 00011110$$

neg

$$= \textcircled{-30}$$

d)  $37 - 30$

Set -30

$00011110 \rightarrow 11100001 + 1 \rightarrow 11100010$

$$\begin{array}{r} 00100101 \\ + 11100010 \\ \hline \textcircled{00000111} = +7 \end{array}$$

e)  $-70 + 58$

Set -70

$01000110 \rightarrow 10111001 + 1 \rightarrow 10111010$

$$\begin{array}{r} 10111010 \\ + 00111010 \\ \hline \textcircled{11010100} \rightarrow 00001011 + 1 \rightarrow \textcircled{-12} \end{array}$$

neg

f)  $88 - 68$

Set -68

$01000100 \rightarrow 10111011 + 1 \rightarrow 10111100$

$$\begin{array}{r} 01011000 \\ + 10111100 \\ \hline \textcircled{00010100} = +20 \end{array}$$



