

# Pierce College

## Comp 516

### Homework #2

#### Unsigned Arithmetic

##### 1. Addition with Conversion

$$137_{10} \rightarrow \underline{89}_{16} \rightarrow \underline{211}_8 \rightarrow \underline{137}_{10}$$

$$91_{10} \rightarrow \underline{5B}_{16} \rightarrow \underline{133}_8 \rightarrow \underline{91}_{10}$$

$$\begin{array}{r} + \\ \underline{228}_{10} \end{array} \rightarrow \underline{E4}_{16} \rightarrow \underline{344}_8 \rightarrow \underline{228}_{10}$$

##### 2. Subtraction with Conversion

$$137_{10} \rightarrow \underline{89}_{16} \rightarrow \underline{211}_8 \rightarrow \underline{137}_{10}$$

$$91_{10} \rightarrow \underline{5B}_{16} \rightarrow \underline{133}_8 \rightarrow \underline{91}_{10}$$

$$\begin{array}{r} - \\ \underline{46}_{10} \end{array} \rightarrow \underline{2E}_{16} \rightarrow \underline{56}_8 \rightarrow \underline{46}_{10}$$

##### 3. Addition with Conversion

$$137_{10} \rightarrow \underline{254}_7 \rightarrow \underline{12002}_3 \rightarrow \underline{115}_{11}$$

$$91_{10} \rightarrow \underline{160}_7 \rightarrow \underline{10101}_3 \rightarrow \underline{83}_{11}$$

$$\begin{array}{r} + \\ \underline{228}_{10} \end{array} \rightarrow \underline{444}_7 \rightarrow \underline{22110}_3 \rightarrow \underline{198}_{11}$$

##### 4. Subtraction with Conversion

$$137_{10} \rightarrow \underline{162}_9 \rightarrow \underline{2021}_4 \rightarrow \underline{89}_{16}$$

$$91_{10} \rightarrow \underline{111}_9 \rightarrow \underline{1123}_4 \rightarrow \underline{5B}_{16}$$

$$\begin{array}{r} - \\ \underline{46}_{10} \end{array} \rightarrow \underline{51}_9 \rightarrow \underline{232}_4 \rightarrow \underline{2E}_{16}$$

5. Addition with Conversion

$$\begin{array}{r}
 21_4 \rightarrow \underline{12}_7 \rightarrow \underline{100}_3 \rightarrow \underline{9}_{11} \\
 13_4 \rightarrow \underline{10}_7 \rightarrow \underline{21}_3 \rightarrow \underline{7}_{11} \\
 + \\
 \underline{100}_4 \rightarrow \underline{22}_7 \rightarrow \underline{121}_3 \rightarrow \underline{15}_{11}
 \end{array}$$

6. Subtraction with Conversion

$$\begin{array}{r}
 21_4 \rightarrow \underline{14}_5 \rightarrow \underline{9}_{16} \rightarrow \underline{11}_8 \\
 13_4 \rightarrow \underline{12}_5 \rightarrow \underline{7}_{16} \rightarrow \underline{7}_8 \\
 - \\
 \underline{2}_4 \rightarrow \underline{2}_5 \rightarrow \underline{2}_{16} \rightarrow \underline{2}_8
 \end{array}$$

**Signed Arithmetic, i.e., 2'S Complement** (16 bit registers) 

7. Addition with Conversion

$$\begin{array}{r}
 137_{10} \rightarrow \underline{89}_{16} \rightarrow \underline{0000\ 0000\ 1000\ 1001}_2 \rightarrow \underline{211}_8 \\
 91_{10} \rightarrow \underline{5B}_{16} \rightarrow \underline{0000\ 0000\ 0101\ 1011}_2 \rightarrow \underline{133}_8 \\
 + \\
 \underline{228}_{10} \rightarrow \underline{E4}_{16} \rightarrow \underline{0000\ 0000\ 1110\ 0100}_2 \rightarrow \underline{344}_8
 \end{array}$$

8. "Subtraction" with Conversion

$$\begin{array}{r}
 137_{10} \rightarrow \underline{0089}_{16} \rightarrow \underline{0000\ 0000\ 1000\ 1001}_2 \rightarrow \underline{000211}_8 \\
 - 91_{10} \rightarrow \underline{FFA5}_{16} \rightarrow \underline{1111\ 1111\ 1010\ 0101}_2 \rightarrow \underline{177645}_8 \\
 + \\
 \underline{46}_{10} \rightarrow \underline{002E}_{16} \rightarrow \underline{0000\ 0000\ 0010\ 1110}_2 \rightarrow \underline{000056}_8
 \end{array}$$

9. Convert the following unsigned numbers:

- a.  $34_{10} \rightarrow \underline{114}_5$
- b.  $34_5 \rightarrow \underline{19}_{10}$
- c.  $34_{10} \rightarrow \underline{28}_{13}$
- d.  $34_5 \rightarrow \underline{16}_{13}$

10. Convert the following from sign & magnitude to 2's complement binary (signed) representation:

a.  $-96_{16} \rightarrow \underline{1111\ 0110\ 1010}_2$  12 bit register

b.  $-96_{10} \rightarrow \underline{1111\ 1010\ 0000}_2$  12 bit register

11. Convert the following from 2's complement (signed) representation in 12 bit registers to the sign & magnitude representation normally used in base 10:

a.  $9F8_{16} \rightarrow \underline{-1544}_{10}$

b.  $011010110011_2 \rightarrow \underline{1715}_{10}$

c.  $5A2_{16} \rightarrow \underline{1442}_{10}$

d.  $101011101101_2 \rightarrow \underline{-1299}_{10}$

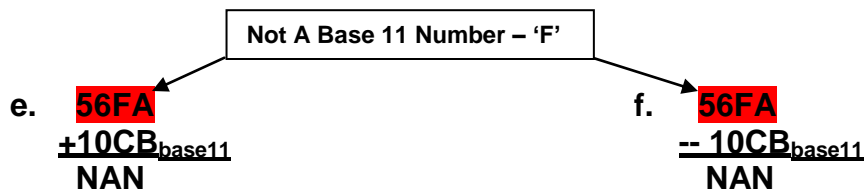
12. Compute the following values:

a. 
$$\begin{array}{r} 56FA \\ +10CB_{base16} \\ \hline 67C5 \end{array}$$

b. 
$$\begin{array}{r} 56FA \\ --10CB_{base16} \\ \hline 462F \end{array}$$

c. 
$$\begin{array}{r} 765 \\ +557_{base8} \\ \hline 1544 \end{array}$$

d. 
$$\begin{array}{r} 765 \\ --557_{base8} \\ \hline 206 \end{array}$$



g. 
$$\begin{array}{r} 654 \\ +556_{base7} \\ \hline 1543 \end{array}$$

h. 
$$\begin{array}{r} 654 \\ --556_{base7} \\ \hline 65 \end{array}$$