Lab Exercise #5 -- Number Systems and Internal Representation

A. Fixed Point Numbers

1. Perform each of the indicated base conversions. For readability, write a blank between each group of four digits in binary and hexadecimal numbers.

a) Give the hexadecimal equivalent of each of the following binary numbers.

1001 1100 0010 1011 1111 0101 0000 0111 = _____

0001 1010 0011 1101 0110 0100 1000 1110 = _____

b) Give the binary equivalent of each of the following hexadecimal numbers.

5e8d = _____

a72b = _____

c) Give the hexadecimal equivalent of the following decimal numbers.

599 = _____

253 = _____

d) Give the binary equivalent of the following decimal numbers.

125 = _____

248 = _____

e) Give the decimal equivalent of each of the following numbers.

47f base 16 = _____

162 base 7 = _____

2. When you have completed Question (1), use the executable program in the file named "~cse320/Labs/lab05.convert" to check your work.

B. ASCII Representation

1. Give the ASCII representation of each of the following character strings in hexadecimal. Don’t forget to include any spaces (blanks).

"abcd" _____

"ABCD" _____

"Go State!" _____

"43.7" _____

"CSE 320" _____

2. When you have completed your work, use the executable program in the file named "~cse320/Labs/lab05.ascii" to check your work.

C. Twos Complement Representation

Suppose that a machine uses twelve-bit registers to hold signed integers and uses twos complement arithmetic.

1. What is the largest signed number that can be represented? Give your answer in both binary and decimal.

   Binary: _____

   Decimal: _____

2. What is the smallest signed number that can be represented? Give your answer in both binary and decimal.

   Binary: _____

   Decimal: _____

3. Give the twelve-bit internal representation of each of the following decimal numbers.

   +317 _____

   -183 _____

4. Give the decimal value of each of the following twelve-bit numbers.

   1110 1011 0011 _____

   0001 1011 1011 _____