EE 2310 Homework #1 Solutions – Binary Numbers and Numeric Conversions

1. Convert the following positive decimal numbers to binary (take the binary point of non-exact fractions to at least 2x the decimal number of places):

126	**111 1110**	**0.125**	**0.001**	**23.57**	**10111.1001**
57	**11 1001**	**0.875**	**0.111**	**11.0625**	**1011.0001**
0.0625	**0.0001**	**77.7**	**10011001.1011**	**32.96875**	**100000.11111**

2. Convert the following positive binary numbers to decimal:

11 1011	**59**	**1010.01**	**10.25**	**111.111**	**7.875**
111 0011	**115**	**0.0011**	**0.1875**	**1111.011**	**15.375**

3. Convert the following binary numbers to hexadecimal (prefix the hexadecimal number with "0x," which means "hexadecimal number").

11010111111100100111010.1111	**0x d7f93a.f**	**10001.11**	**0x 11.c**
1110.01111001111010111111	**0xe.79ebf**	**1111010.001**	**0x7a.2**
1010010111111011.111101	**0x a6fb.f4**	**101101.00011**	**0x 2d.18**

4. Convert the following hexadecimal numbers to binary (byte form):

0x d6.e8	**1101 0110.1110 1**	**0x 2eb5.cc4**	**10 1110 1011 0101.1100 1100 01**
0x 548cf.b3	**101 0100 1000 1100 1111.1011 0011**	**0x f8.d8**	**1111 1000.1101 1**

5. Convert the following two's complement binary numbers to decimal. (Remember to show all 8 bits in 2's complement, which includes the sign bit).

1001 1111	**–97**	**1010 1111**	**–81**	**0110 1000**	**104**
1111 1100	**–4**	**0111 0111**	**119**	**1100 0001**	**–63**
0010 0110	**38**	**1111 0001**	**–15**	**1000 0010**	**–126**

6. Convert the following decimal numbers to signed binary numbers, using the 2's complement sign convention:

–2	**1111 1110**	**–101**	**1001 1011**	**–96**	**1010 0000**
–54	**1100 1010**	**75**	**0100 1011**	**121**	**0111 1001**
–110	**1001 0010**	**99**	**0110 0011**	**–23**	**1110 1001**

7. Perform the indicated math operation (numbers are <u>two's complement binary</u>). <u>Write the decimal value of the answer below the binary answer</u>.

1110 0111	**(−25)**	**0011 1000**	**(56)**
+<u>0111 1100</u>	**(124)**	**− <u>1011 1010</u>**	**(−[−70])**
0110 0011	**(+99)**	**0111 1110**	**(+126)**

8. Perform the indicated math operation (numbers are <u>two's complement binary</u>). <u>Write the decimal value of the answer below the binary answer</u>.

0000 0111	**(+7)**	**1111 1000**	**(−8)**
–<u>0111 0000</u>	**(–112)**	**− <u>1100 0001</u>**	**(−[−63])**
0110 0011		**0111 1110**	
0000 0111	**(+7)**	**1111 1000**	**(−8)**
+<u>1001 0000</u>	**+(–112)**	**+ <u>0011 1111</u>**	**(+63])**
1001 0111	**(–105)**	**0011 0111**	**(+55)**

These last two problems are worked out, showing how to "subtract by adding."