Homework #1

For this assignment, please show all work. When submitting your assignment, please make sure you upload your document that shows your work along with the solutions clearly identified.

PART I

1. In an 8-bit binary number, which is the most significant bit (MSB)?

2. What is the decimal representation of each of the following unsigned binary integers?

    a. 00110101

    b. 10010110

    c. 11001100

3. What is the sum of each pair of binary integers?

    a. 10101111 + 11011011

    b. 10010111 + 11111111

    c. 01110101 + 10101100

4. Calculate binary 00001101 minus 00000111.

5. How many bits are used by each of the following data types?

    a. word

    b. doubleword

    c. quadword

    d. double quadword

6. What is the minimum number of binary bits needed to represent each of the following unsigned decimal integers?

    a. 4095

    b. 65534

    c. 42319

7. What is the hexadecimal representation of each of the following binary numbers?

    a. 0011 0101 1101 1010

    b. 1100 1110 1010 0011

c. 1111 1110 1101 1011

8. What is the binary representation of the following hexadecimal numbers?

a. 0126F9D4

b. 6ACDFA95

c. F69BDC2A

9. What is the unsigned decimal representation of each of the following hexadecimal integers?

a. 3A

b. 1BF

c. 1001

10. What is the unsigned decimal representation of each of the following hexadecimal integers?

a. 62

b. 4B3

c. 29F

11. What is the 16-bit hexadecimal representation of each of the following signed decimal integers?

a. -24

b. -331

12. What is the 16-bit hexadecimal representation of each of the following signed decimal integers? 12. What is the 16-bit hexadecimal representation of each of the following signed decimal integers?

a. -21

b. -45

13. The following 16-bit hexadecimal numbers represent signed integers. Convert each to decimal.

a. 6BF9

b. C123

14. The following 16-bit hexadecimal numbers represent signed integers. Convert each to decimal.

a. 4CD2

b. 8230

15. What is the decimal representation of each of the following signed binary numbers?

a. 10110101

b. 00101010

c. 11110000

16. What is the decimal representation of each of the following signed binary numbers?

a. 10000000

b. 11001100

c. 10110111

17. What is the 8-bit binary (two's-complement) representation of each of the following signed decimal integers?

a. -5

b. -42

c. -16

18. What is the 8-bit binary (two's-complement) representation of each of the following signed decimal integers?

a. -72

b. -98

c. -26

19. What is the sum of each pair of hexadecimal integers?

a. 6B4 + 3FE

b. A49 + 6BD

20. What is the sum of each pair of hexadecimal integers?

a. 7C4 + 3BE

b. B69 + 7AD

21. What are the hexadecimal and decimal representations of the ASCII character capital B?

22. What are the hexadecimal and decimal representations of the ASCII character capital G?

PART II

1. For each of the following binary floating-point numbers, supply the equivalent value as a base 10 fraction, and then as a base 10 decimal. The first problem has been done for you:

Binary Floating-Point	Base 10 Fraction	Base 10 Decimal
1.101 *(sample)*	1 5/8	1.625
11.11		
1.1		
101.001		
1101.0101		
1110.00111		
10000.101011		
111.0000011		
11.000101		

2. For each of the following exponent values, shown here in decimal, supply the actual binary bits that would be used for an 8-bit exponent in the IEEE Short Real format. The first answer has been supplied for you:

Exponent (E)	Binary Representation
2 *(sample)*	10000001
5	
0	
-10	
128	
-1	

3. For each of the following floating-point binary numbers, supply the normalized value and the resulting exponent. The first answer has been supplied for you:

Binary Value	Normalized As	Exponent
10000.11 *(sample)*	1.000011	^{4}
1101.101		

.00101		
1.0001		
10000011.0		
.0000011001		

4. For each of the following floating-point binary examples, supply the complete binary representation of the number in IEEE Short Real format. The first answer has been supplied for you:

Binary Value	Sign, Exponent, Mantissa
-1.11 *(sample)*	1 01111111 11000000000000000000000
+1101.101	
-.00101	
+100111.0	
+.0000001101011	