CS 201 – HW #2

Your Name: _____

*Please print this out, write your answers **CLEARLY**, and turn in hardcopy.*
Perform these calculations without using a calculator!!!

QUESTION 1: Create a table showing the first 16 binary numbers, their decimal values, and their representations as a hex numeral.

Binary	Decimal	Hex

QUESTION 2: Convert the following binary numbers to hex.

`0110 0011 0101 1100 1001 0001 0111 1111` : _____

`0000 0010 0100 0110 1000 1010 1100 1110` : _____

`1111 1101 1011 1001 0111 0101 0011 0001` : _____

QUESTION 3: Convert the following hex numbers to binary.

`A6C2` : _____

`80` : _____

`00000001` : _____

`ffff` : _____

`87654321` : _____

`9ABCDEF0` : _____

QUESTION 4: How many bits in a byte? _____ In a word? _____

QUESTION 5: How many bytes in a

8-bit quantity? _____

16-bit quantity? _____

32-bit quantity? _____

64-bit quantity? _____

QUESTION 6: Show an arbitrary value *in binary*. (Just make up values; what counts is the number of bits.)

1 byte quantity: _____

2 byte quantity: _____

4 byte quantity: _____

QUESTION 7: Show an arbitrary value *in hex*. (Just make up values; what counts is the number of numerals.)

64-bit quantity: _____

32-bit quantity: _____

16-bit quantity: _____

8-bit quantity: _____

QUESTION 8: Create a table of powers of 2

2^0: _____

2^1: _____

2^2: _____

2^3: _____

2^4: _____

2^5: _____

2^6: _____

2^7: _____

2^8: _____

2^9: _____

2^{10}: _____

2^{16}: _____

2^{32}: _____

QUESTION 9: Convert the following binary numbers to decimal:

10 : _____

100 : _____

1000 : _____

10000 : _____

1100 : _____

10101010 : _____

100 : _____

01110 : _____

QUESTION 10: Convert the following decimal numbers to binary. Show each as a 2 byte quantity!

13: _____

32: _____

256: _____

486: _____

6,831: _____

89: _____

143: _____

65,535: _____

32,768: _____

QUESTION 11: How many bits in a "C" language variable of type **`char`**? _____

How many bytes? _____

QUESTION 12: How many bits in a "C" language variable of type **`int`**? _____ How many bytes? _____

QUESTION 13: How many bits in a "C" language variable of type "**`long long`**"?

_____ How many bytes? _____

(HINT: "**`long long`**" is an abbreviation for "**`long long int`**". And "**`long`**" is an abbreviation for "**`long int`**". However, "**`long long int`**" and "**`long int`**" are not necessary the same size.)

QUESTION 14: How many bits in a "C" language variable of type **`float`**? _____

How many bytes? _____

QUESTION 15: How many bits in a "C" language variable of type **`double`**? _____

How many bytes? _____

QUESTION 16: Take the following bit strings and perform the bitwise logical AND operation.

```
0101 1100 1010 1111 0110 0110 0111 1011
1101 0110 0100 0011 0111 1001 1000 0011
```

Show the result in binary: _____

Show the result in hex: _____

QUESTION 17: Using the same values, perform the bitwise logical OR operation.

Show the result in binary: _____

Show the result in hex: _____

QUESTION 18: Using the same values, perform the bitwise logical XOR operation.

Show the result in binary: _____

Show the result in hex: _____

QUESTION 19: Assuming two's complement representation (i.e., "signed" numbers), convert the following decimal values to 8-bit binary values and show in…

	Binary	**Hex**
0:		
+1:		
-1:		
+2:		
-2:		
+126:		
-127:		
+127:		
-128:		

QUESTION 20: Assuming two's complement representation (i.e., "signed" numbers), convert the following 8-bit binary values to decimal:

00000000: _____

00000001: _____

00000010: _____

01111110: _____

01111111: _____

10000000: _____

10000001: _____

11111110: _____

11111111: _____

QUESTION 21: Assuming two's complement representation (i.e., "signed" numbers), convert the following 16-bit values (shown in hex) into decimal:

`0000:` _____

`0005:` _____

`0007:` _____

`7ffe:` _____

`7fff:` _____

`8000:` _____

`8001:` _____

`fffe:` _____

`ffff:` _____

QUESTION 22: Describe Big Endian.

_____

_____

QUESTION 23: Describe Little Endian.

_____

_____

QUESTION 24: How many bits are used for addresses (i.e., pointers) on the IA32 architecture? _____ On the X86-64 architecture? _____

QUESTION 25: What does the following IA32 instruction do:

```
movl    123,%eax
```

_____

_____

QUESTION 26: What do the following IA32 instructions do:

```
movl    123,%eax
```

```
movw    123,%ax
```

```
movb    123,%al
```

```
movb    123,%ah
```

QUESTION 27: What does the following IA32 instruction do:

```
addl    %ebx,%edx
```

QUESTION 28: Write an instruction to add the contents of 16-bit register `%dx` to `%cx` and place the result in `%dx`:

QUESTION 29: Assume `j` in an "`int`" and is stored in `%edx`. What instruction will perform this "C" assignment statement?

```
j = 123;
```

QUESTION 30: Consider these "C" declarations; how many bytes are used to store the variables?

```
int i;          _____
char myCh;      _____
int myArry [8]; _____
char * p;       _____
int * p3;       _____
char * myA [4]; _____
```

QUESTION 31: Here are signed numbers, shown in hex. The sign of each quantity is obvious from the number of hex numerals. Negate each quantity and show the result in hex.

```
     034B: _____
       AB: _____
 7FFFFFFF: _____
     1234: _____
       FF: _____
 00000001: _____
```

QUESTION 32: Here are some binary fractions. What is the number in decimal. (Please write your answer in this form: $4^{3}/_{4}$, not 19/4 or 4.75)

```
          0.1: _____
         1.01: _____
       11.001: _____
       0.0001: _____
      111.011: _____
      110.111: _____
      101.101: _____
     101.1010: _____
101.10100000: _____
```

QUESTION 33: In the IA32 architecture, there are 8 registers of 32 bits each. What are their names?

_____

_____

_____

_____

_____

_____

_____

_____

QUESTION 34: Show the ASCII codes for the following characters:

	Decimal	**Binary**	**Hex**
‘a’:	_____	_____	_____
‘A’:	_____	_____	_____
‘j’:	_____	_____	_____
‘J’:	_____	_____	_____
‘0’:	_____	_____	_____
‘3’:	_____	_____	_____
‘)’:	_____	_____	_____
‘ ’:	_____	_____	_____
‘\0’:	_____	_____	_____
‘\n’:	_____	_____	_____
‘\r’:	_____	_____	_____