**Binary Assignment # 1** – 20 Points

The binary number system is also called Base 2 because there are only two numbers that we use: 0 or 1. The reason we study this number system is because it is the language that machines speak. Computers on a network, for example, often use electric pulses (high level or low level) to communication a 1 or 0 value. Large groups of these numbers are used to communicate their message, similar to Morse code.

An electric pulse can either be interpreted as a 1 (on or high level) or a 0 (off or low level). Each pulse (or absence) represents one value or the other. If a computer receives a single “on” pulse, it translates it as a “1”. Computers call these individual pulses “bits” and put them into groups of eight, called a “byte”. You will work frequently with bytes of data, as this typically is what is used to express one single letter. Each character has its own special combination of 1s and 0s. For example, 01011000 is the universal code for a capital X. That binary numbers expression equals 88 in decimal, our accustomed number system.

You can visit <http://www.asciitable.com> to see the other characters. You will find many special characters, such as vowels with accent marks. (â = 131) In order to make use of these special characters, you must hold down the <alt> key while typing in the ASCII code. When you release alt, the special character code will appear. Type in the following phrase:

Pour ½ des Noëls, François a mangé le dîner à ma château. (7 special characters)

Which ACSII codes did you use?

What we need to be able to do at this point is take a number in the range of 0 to 255 and be able to make it in binary. 255 is the biggest number we can express with eight bits. Here’s how it is done:

First we have to understand that we are dealing with base 2, not base ten. When you see the binary number 10000011, its value is no where near ten million, like it is in decimal. Here’s what we have to know. Each of these eight numbers has a different value and either its counted (1) or it is not (0). Take a look at our example:

128 64 32 16 8 4 2 1

1 0 0 0 0 0 1 1

The numbers above are the decimal values of each binary place value and they NEVER change. All we have to do is memorize, which is easy because you just start at 1 and double it seven times. A 1 value means we count it, a 0 means we do not. In this example, we count 128, 2 and 1. When we add these together, the resulting value is 131. Easy! Try a few for yourself:

11000010 - 10000110 -

11111110 - 01100011 -

00011100 - 11001101 -

0101011 - 11100111 -

00001011 - 1101101 -