1. If we have 16 bits, how many different numbers can we have?

   2^{16} = 65536 different numbers

2. What is the largest number with 16 bits?

   2^{16} - 1 = 65535 is the largest number

3. Converting the binary number 110011011 to the decimal number? (show the process)

   1 1 0 0 1 1 0 1 1

   1 * 1 = 1

   1 * 2 = 2

   0 * 4 = 0

   1 * 8 = 8

   1 * 16 = 16

   0 * 32 = 0

   0 * 64 = 0

   1 * 128 = 128

   1 * 256 = 256

Answer = 411

4. Converting the decimal number 56 to the binary number? (show the process)

   Step 1: Need at least 6 bits

   Step 2:

   32 16 8 4 2 1

   ? ? ? ? ? ?

Step 3/4:

32 16 8 4 2 1

1 1 1 0 0 0

5. Calculate 45 & 34 (show the process)

45_{10} = 1 0 1 1 0 1_2

34_{10} = 1 0 0 0 1 0_2

45 & 34 = 32(1 0 0 0 0 0_2)

6. Calculate 78 | 87 (show the process)

78_{10} = 1 0 0 1 1 1 0_2

87_{10} = 1 0 1 0 1 1 1_2

78 | 87 = 95(1 0 1 1 1 1 1_2)

7. Calculate 53 ^ 23 (show the process)

53_{10} = 1 1 0 1 0 1_2

23_{10} = 0 1 0 1 1 1_2

53 ^ 23 = 34(1 0 0 0 1 0_2)

8. What is the value of ~39?

39 = 100111

~39 = 24(011000)

9. Converting the -89 to the binary number?

89 = 1011001

1011001

¬ 0100110

\+ 1

= 0100111

10. Calculate 37 << 3?

    $37_{10} = 100101_2$

    $100101_2 << 3 = 101000_2$

    $= 40$

11. Calculate 13 >> 4?

    $13_{10} = 1101_2$

    $1101 >> 4 = 0000_2$

    $= 0$