1. Number Conversion
   1. Convert the following unsigned binary numbers to decimal:
      1. 11111 = 31
      2. 10001 = 17
      3. 101 = 5
      4. 001 = 1
   2. Convert the following decimal numbers to binary:
      1. 1111 = 10001010111
      2. 0000 = 0
      3. 135 = 10000111
      4. 16 = 10000
   3. Convert the following octal numbers to binary:
      1. 1111 = 1001001001
      2. 731 = 111011001
      3. 777 = 111111111
      4. 1 = 1
   4. Convert the following binary numbers to octal:
      1. 101 010 111 001 = 5271
      2. 1 001 = 11
   5. Convert the following decimal numbers to octal:
      1. 512 = 1000
      2. 127 = 177
   6. Convert the following octal numbers to decimal:
      1. 101 = 65
      2. 2345 = 1253
   7. Convert the following binary numbers to hexadecimal:
      1. 1010 0010 0100 1111 = A24F
      2. 1 0001 1001 1111 = 119F
   8. Convert the following hexadecimal numbers to binary:
      1. abcdef = 101010111100110111101111
      2. 3A2B = 11101000101011
      3. FACE = 1111101011001110
      4. BAD = 101110101101
      5. DAD = 110110101101
      6. FADE2 = 11111010110111100010
   9. Convert the following decimal numbers to hexadecimal:
      1. 1023 = 3FF
      2. 65535 = FFFF
      3. 4321 = 10E1
      4. 1111 = 457
      5. 13579 = 350B
   10. Convert the following hexadecimal numbers to decimal:
       1. abcdef = 11259375
       2. FACE = 64206
       3. BAD = 2989
       4. DAD = 3501
2. Which of the following binary numbers are even? How can you tell if a binary number is even or odd? Note that a number divisible by 2 is even. Otherwise, it is odd.
   1. 1010010101 = odd
   2. 1111111000 = even
   3. 101010101010101010101 = odd
   4. 10000000000000000000000001 = odd
   5. 11111111111111111111111111111 = odd
   6. 11111111111111111111111111110 = even

* If the LSB is 1 the number is odd otherwise the number is even.

1. Convert 102310 to binary and negate it using two’s complement. Compute -1023+1023 in binary. What results you expect and why?
   1. 1023 to binary = 1111111111
   2. 1111111111 two’s complement = 0000000001
   3. 0000000001 + 1111111111 = 0000000000

* I expected to get 0 as a result and that is what happened

1. Convert the decimal fraction 1 5/16 (1.3125) to binary. Use a “binary period” to separate the integral part and the fraction part.
   1. 1 5/16 (1.3125) = 1.0101
2. Given n bits, how many signed numbers can be represented using the sign-and-magnitude method, the one’s complement method, and the two’s complement method?
   1. sign-and-magnitude = -(2n-1 -1) to +(2n-1 -1)
   2. one’s complement = -(2n-1 -1) to +(2n-1 -1)
   3. two’s complement = -(2n-1) to +(2n-1 -1)
3. In two’s complement method, why is there one more negative number than there are positive numbers?
   1. ﻿Because two's complement is designed to circumvent the duplicate zero problem found in the sign-and-magnitude and one’s complement methods. In this method, negative numbers are represented by ones' complement plus one. By doing so, the negative numbers in a sense are shifted to the left (smaller) by one. The negative zero represented by ones' complement becomes -1 to the two's complement method.