Binary to Decimal:

- Each digit in binary represents a power of 2
- Starting from the right: 2^0, 2^1, 2^2...
- The decimal answer is the sum of all the powers of 2 that have a 1 in its corresponding slot (skip it if it has a 0)
- Example:
    - **1011 0101**
    - From right to left: 2^0 + 2^2 + 2^4 + 2^5 + 2^7 = **181**

Decimal to Binary:

- Every decimal number can be expressed as a sum of binary numbers (use binary-decimal conversions as proof); every number can be represented in another base
- Basic algorithm:
    - Given a decimal number, find the biggest power of 2 that can fit inside that number
    - Subtract that power of 2 from that number
    - Repeat the process until you get 0 (remember that 1 is a power of 2; 2^0 = 1)
    - The resulting binary number is the result of all those powers of 2 (put a 1 for each corresponding binary digit used, 0 if it's not used)
    - (Optional): Split into groups of 4 and add 0's to make it even
- Example:
    - **300**
    - 300 = 256 + 32 + 8 + 4
    - 2^8 + 2^5 + 2^3 + 2^2
    - **0001 0010 1100**

Hexadecimal to Decimal:

- Hex numbers go from 0-9, A-F
- Easy way is to first convert to binary
- Convert each hexadecimal digit into a set of 4 binary numbers
- Convert that binary number to decimal
- Example:
    - **A9**
    - A = 10 = 1010
    - 9 = 1001
    - 1010 1001
    - 1010 1001 = 2^0 + 2^3 + 2^5 + 2^7 = **169**

Decimal to Hexadecimal:

- Easier (in my opinion) to convert the decimal into its binary equivalent
- Split the binary numbers into groups of 4
- Convert each set of 4 binary numbers into its corresponding hexadecimal digit
- Example:
    - **72**
    - 72 = 0100 1000 = **48** (NOTE THAT 48 IN HEX IS NOT THE SAME AS 48 IN DECIMAL)

Useful table for conversions:

Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F