**Number Systems**

* Base-10
  + The number system we are most familiar with
  + Uses 10 digits
* Binary
  + The simplest counting system
  + Used as the foundation for programming
  + Uses 2 digits, 1 and 0
* Hexadecimal
  + Also known as Base 16
  + Uses 16 digits
  + The first ten digits are the numbers 0-9, and the following six digits are usually the letters A-F
  + Hexadecimal is commonly used for computers because it can be easily translated to binary, and vise versa
    - One digit in hexadecimal represents four digits (bits) in binary
    - 0000 to 1111 in binary is 0 to F in hexadecimal

**Some Conversions**:

Binary to Decimal Examples:

11112 = 810 + 410 + 210 + 110

= 1510

10112 = 810 + 010 + 210 + 110

= 1110

Hex to Binary

Each hexadecimal digit translates to a set of four binary digits, and vice versa

Hex Binary

| 0 | 0000 |
| --- | --- |
| 1 | 0001 |
| 2 | 0010 |
| 3 | 0011 |
| 4 | 0100 |
| 5 | 0101 |
| 6 | 0110 |
| 7 | 0111 |
| 8 | 1000 |
| 9 | 1001 |
| A | 1010 |
| B | 1011 |
| C | 1100 |
| D | 1101 |
| E | 1110 |
| F | 1111 |

Example: 010111012 = 5D16

Hexadecimal to Decimal Example

F F

161 160 F16 = 1510 FF16 = ((15 \* 16) + (15 \* 1))10

FF16 = 25510