# Special Purpose Codes

* BCD – Binary Coded Decimal
  + - Ex. 1523 - 0001 0101 0010 0011
    - + 3691 - 0011 0110 1001 0001
    - = 5214 - 0101 0010 0001 0100
  + Advantage:
    - Easy to convert to base 10
  + Disadvantage
    - Arithmetic more complex
    - If result is > 9 then add 6
    - Storage is much more inefficient
  + Usage:
    - Applications that don’t require very little storage
      * Calculators
      * Digital watches
      * Banking applications
* Natural Binary
  + Weighted code
    - Position indicates weight
  + Unweighted codes can be useful
    - Unit distance code:
      * Hamming distance = number of bits in which two words differ
      * Unit Distance Code = when consecutive words have a hamming distance of 1
      * Natural binary is **NOT** a unit distance code
      * The most popular unit distance is called the Grey Code
        + 1-bit gray code is 0 1
        + 2-bit gray code is 0 0, 0 1, 1 1, 1 0
      * To Produce n-bit Gray code:
        + Write down the n-1 bit gray code
        + Write down the n-1 bit gray code in reverse order
        + Prepend the 1st half with a zero
        + Prepend the 2nd half with a 1
* NOTEBOOK WORK titled 2-2-17