

Logic Design

1. In a **binary coded decimal (BCD)** system, 4 bits are used to represent a decimal digit from 0 to 9. For example, 37_{10} is written as 00110111_{BCD} .

(a) Write 289_{10} in BCD

(b) Convert $100101010001_{\text{BCD}}$ to decimal

(c) Convert 01101001_{BCD} to binary

(d) Explain why BCD might be a useful way to represent numbers

2. Convert the following decimal numbers to 6-bit two's complement binary numbers and subtract them. Indicate whether or not the difference **overflows** a 6-bit result.

(a) $18_{10} - 12_{10}$

(b) $30_{10} - 9_{10}$

(c) $-28_{10} - 3_{10}$

(d) $-16_{10} - 21_{10}$

3. Convert each of the following **octal** numbers to binary, hexadecimal, and decimal.

(a) 23_8

(b) 45_8

(c) 371_8

(d) 2560_8