

1. Make the following base conversions. Use shortcuts when applicable.

(a) 101100101_2 to decimal

$$101100101_2 = 1 \times 2^0 + 0 \times 2^1 + 1 \times 2^2 + 0 \times 2^3 + 0 \times 2^4 + 1 \times 2^5 + 1 \times 2^6 + 0 \times 2^7 + 1 \times 2^8 = 1 + 4 + 32 + 64 + 256 = 357$$

(b) 101110101111010_2 to hexadecimal (base 16)

$$\underbrace{0101}_{5} \underbrace{1101}_{D} \underbrace{0111}_{7} \underbrace{1010}_{A} = 5D7A$$

(c) 101110101111010_2 to octal (base 8)

$$\underbrace{10111}_5 \underbrace{010}_6 \underbrace{111}_7 \underbrace{010}_2 \rightarrow \left. \begin{array}{l} 0101 = 5 \\ 0110 = 6 \\ 0101 = 5 \\ 0111 = 7 \\ 0010 = 2 \end{array} \right\} 56572$$

(d) 593_{10} to binary

$$\begin{array}{r} 593 \div 2 = 296 \text{ R } 1 \\ 296 \div 2 = 148 \text{ R } 0 \\ 148 \div 2 = 74 \text{ R } 0 \\ 74 \div 2 = 37 \text{ R } 0 \\ 37 \div 2 = 18 \text{ R } 1 \\ 18 \div 2 = 9 \text{ R } 0 \\ 9 \div 2 = 4 \text{ R } 1 \\ 4 \div 2 = 2 \text{ R } 0 \\ 2 \div 2 = 1 \text{ R } 0 \\ 1 \div 2 = 0 \text{ R } 1 \end{array}$$

$$1001010001_2$$