

Computer Science I – Spring 2012
Lab: Base Conversion (*Solutions*)

1) Convert 11101011_2 to decimal.

$$11101011_2 = 2^7 + 2^6 + 2^5 + 2^3 + 2^1 + 2^0 = 235_{10}$$

2) Convert 937_{10} to binary.

$$\begin{array}{rcl} 937 / 2 & = & 468 \text{ R } 1 \\ 468 / 2 & = & 234 \text{ R } 0 \\ 234 / 2 & = & 117 \text{ R } 0 \\ 117 / 2 & = & 58 \text{ R } 1 \\ 58 / 2 & = & 29 \text{ R } 0 \\ 29 / 2 & = & 14 \text{ R } 1 \\ 14 / 2 & = & 7 \text{ R } 0 \\ 7 / 2 & = & 3 \text{ R } 1 \\ 3 / 2 & = & 1 \text{ R } 1 \\ 1 / 2 & = & 0 \text{ R } 1, \text{ so } 937_{10} = 1110101001_2. \end{array}$$

3) Convert 294_{10} to binary.

$$\begin{array}{rcl} 294 / 2 & = & 147 \text{ R } 0 \\ 147 / 2 & = & 73 \text{ R } 1 \\ 73 / 2 & = & 36 \text{ R } 1 \\ 36 / 2 & = & 18 \text{ R } 0 \\ 18 / 2 & = & 9 \text{ R } 0 \\ 9 / 2 & = & 4 \text{ R } 1 \\ 4 / 2 & = & 2 \text{ R } 0 \\ 2 / 2 & = & 1 \text{ R } 0 \\ 1 / 2 & = & 0 \text{ R } 1, \text{ so } 294_{10} = 100100110_2. \end{array}$$

4) Convert $28DE7C_{16}$ to octal (base 8)

$$28DE7C_{16} = 0010 \ 1000 \ 1101 \ 1110 \ 0111 \ 1100_2 = 12157174_8.$$

5) Convert 431202_5 to base 7

$$431202_5 = 4 \times 5^5 + 3 \times 5^4 + 1 \times 5^3 + 2 \times 5^2 + 2 \times 5^0 = 14552_{10}.$$

$$14552 / 7 = 2078 \quad \text{R } 6$$

$$2078 / 7 = 296 \quad \text{R } 6$$

$$296 / 7 = 42 \quad \text{R } 2$$

$$42 / 7 = 6 \quad \text{R } 0$$

$$6 / 7 = 0 \quad \text{R } 6, \text{ so } 431202_5 = 60266_7.$$