

EE 2381 DIGITAL COMPUTER LOGIC

Homework #2
23 Jan 2007

Professor Jim Dunham
Due: 30 Jan 2007

Review Mano Text: Chapter 1, sections 7 and 9; Chapter 2, sections 1-4.

1. Construct a table for a 5 3 1 1 weighted code and write the decimal number $9,746_{10}$ using your code. Note that there may be multiple representations for a decimal digit. In such cases, chose the representation with the fewest number of ones in the code word. If there is more than one representation with the fewest number of ones, convert the four bits to a hexadecimal number and chose the one with the smallest hexadecimal number value.
2. Perform the indicated octal arithmetic operations in octal:
 - (a) $5,742_8 + 74_8$ (addition).
 - (b) $5,742_8 - 74_8$ (subtraction).
 - (c) $5,742_8 * 74_8$ (multiplication).
 - (d) $5,742_8 / 74_8$ (division).
- 3 Add and multiply $A3_{16}$ and $2D_{16}$ without converting them to decimal.
4. Find the binary representations for each of the following BCD numbers:
 - (a) 0101 1001 0110 0111
 - (b) 0010 1000 0001 0000 . 0011
5. Show the bit configuration that represents the decimal number 279_{10} in:
 - (a) binary.
 - (b) BCD.
 - (c) ASCII.
6. Demonstrate by means of truth tables the validity of DeMorgan's law
$$\overline{XY} = \overline{X} + \overline{Y}.$$
7. Prove the following Boolean identity using algebraic manipulations
$$\overline{X} + Z = \overline{X} \overline{Z} + \overline{X} Z + X Z.$$
8. Find the complement of the Boolean expression
$$(A + B + \overline{D})(\overline{B} + \overline{C})(A + \overline{B}).$$

The only complements in your final expression should be for single Boolean variables.
9. Draw logic diagrams for the following Boolean expression. The diagram should correspond exactly to the equation. Assume that the complements of the inputs are not available.
$$\overline{\overline{(A + D)(\overline{A} \overline{C} + B)(\overline{A} B + C)}}.$$