1103-1054 陳柔綾

Logic Design & Labs (I) - Midterm

2022/04/14

1. **(18 points) Number conversion**: Giving the two decimal numbers 567 and 1250,

   a. (6 pts) Convert them to binary numbers. $(567)_{10} = (1000110111)_2 = (237)_{16}$

   b. (6 pts) Convert them to hexadecimal numbers. $(1250)_{10} = (100111000010)_2 = (4E2)_{16}$

   c. (6 pts) Use Binary-Coded Decimal to represent the two numbers.

   5 6 7 — 0101 0110 0111

   1 2 5 0 — 0001 0010 0101 0000

2. **(26 points) Prove by the truth table**: Are the Boolean functions F1 and F2 shown below equivalent or not?

   F1 = $AB + BC$

   F2 = $A'B + AC' + ABC$

3. **(32 points) K-map**: Simplify the following Boolean functions by the map method

   (a) (8 pts) $F(A, B, C) = \sum(3, 4, 5, 7)$, $d(A, B, C) = \sum(2, 6)$

   (b) (12 pts) $F(A, B, C, D) = \sum(0, 2, 5, 7, 8, 10, 13, 15)$

   (c) (12 pts) $F(A, B, C, D) = AC'D + CD + AC'D' + BCD'$

4. **(12 points)** True or false

   X (a) (4 pts) Binary-Coded Decimal is a kind of binary number conversion.

   O (b) (4 pts) American Standard Code for Information Interchange (ASCII) uses seven bits to code 128 characters.

   X (c) (4 pts) A register is a contiguous group of binary cells, and a register n binary cells can store *n*-bit information, which has 2^n possible states.

5. **(12 points)** Parity check: A parity bit is an extra bit included with a message to make the total number of 1's either even or odd. Considering ASCII X (1011000) and ASCII & (0100110), what are their parity bits respectively with even and odd parity mechanisms? 最左邊