MSE Hand in 3

The assignments are to be solved in pairs. Each pair can only hand in one solution. Submission by the end of class. The assignments must be solved by hand.

Assignment 1

These are recap exercises from last week's topic.

(a) What is $F(1337_8)$ where F is defined as $F(x) = x_{16}$?

(b) What is the result of $10_{16} + 100_{10} + 1000_8 + 10000_2$?

Assignment 2

Calculate

(a) $1 \cdot \overline{0}$

(b) $1 + \overline{1}$

(c) $\overline{1 + 0 \cdot 1}$

Assignment 3

Use truth tables to show all the possible inputs and outputs of

(a) $F(x) = x \cdot \overline{x} + (x + \overline{x})$

(b) $G(x, y) = \overline{x} \cdot \overline{y} + \overline{x \cdot y}$

(c) $H(x, y, z) = \overline{x} \cdot y + \overline{z}$

Assignment 4

Show that

(a) $x \cdot y + \overline{x} \cdot y = y$

(b) $x + y \cdot (\overline{x} + \overline{y}) = x + y$

(c) $x \cdot y \cdot z + \overline{x \cdot y \cdot z} = 1$

Assignment 5

An airline denies boarding for passengers if they 1) have no ticket, unless they paid extra or arrived early, 2) did not arrive early, unless they paid extra or are not a child, 3) are a child, unless they paid extra or have a ticket, 4) said "bomb", unless they paid extra or are a child.

(a) Define the non-negated boolean variables needed (e.g. "let T be 1 if the passenger has a ticket, 0 if not") to represent the above criteria for boarding.

(b) Define a single boolean function F that takes the variables from (a) and returns true if the passenger is allowed boarding, considering all four (1-4) stated criteria for denial.

(c) Simplify the function F from (b), and identify in which cases passengers are allowed to board.