

CMSC 313 Spring 2024

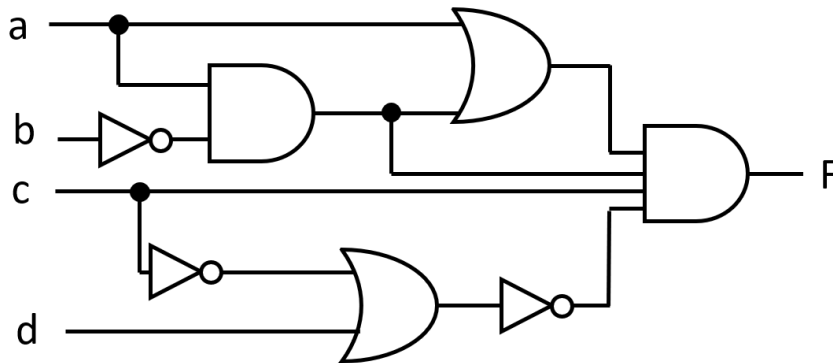
Quiz 2

Full Name _____ Student ID _____

For every exercise, show your work. Not showing complete work may result in penalties. Box your final answer.

Exercise 1. (10 pts) Convert the equation $F(a, b, c) = (a + b)(\bar{c})$ to **Canonical Sum of Products** using a truth table. Your final answer should be in Σ notation.

Exercise 2. (10 pts) Convert the circuit below to a boolean equation for F. Do not simplify the equation.



Exercise 3. (10 pts) There is an error in the following simplification. Identify the step number in the simplification where the error was made. Correct that line, but **do not complete the rest of the proof.**

$$G = \overline{(\bar{a} + c)}c + cb$$

1. $= \overline{\bar{a} + c} \cdot \bar{c} + cb$ (DeMorgan's)
2. $= \bar{a} \bar{c} \cdot \bar{c} + cb$ (DeMorgan's)
3. $= a \bar{c} \cdot \bar{c} + cb$ (Involution)
4. $= a\bar{c} + cb$ (Idempotent)

Rules

DeMorgan's: $\overline{x + y} = \bar{x} \cdot \bar{y}$ and $\overline{x \cdot y} = \bar{x} + \bar{y}$

Involution: $\overline{\bar{x}} = x$

Idempotent: $x + x = x$ and $x \cdot x = x$

Exercise 4. (10 pts) Find the 4 variable Karnaugh map of the following and then find the minimized expression in **Sum of Product (SOP)** form (circle the 1s).

$$F(a, b, c, d) = \Sigma(0, 11, 13, 14, 15) + d(2, 10, 12)$$