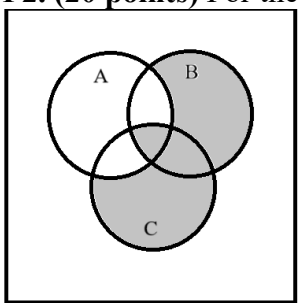
CprE 2810 HW05
ELECTRICAL AND COMPUTER ENGINEERING
IOWA STATE UNIVERSITY

Midterm Review Assignment
Assigned Date: Fifth Week
Due Date: Monday, Sep. 29, 2025

P1. (15 points) Number conversions. In all cases, show your work, not just the final result.

A. Convert $\texttt{C0FFEE}_{16}$ to binary.
B. Convert $\texttt{C0FFEE}_{16}$ to quaternary (base 4).
C. Convert $\texttt{C0FFEE}_{16}$ to octal.
D. Convert $\texttt{C0FFEE}_{16}$ to decimal.
E. Convert `C0FFEE` to breakfast.

P2. (20 points) For the Venn diagram shown below:



A. Draw the corresponding truth table.
B. Draw the corresponding K-map.
C. Write the minimized SOP expression.
D. Draw the circuit diagram for the minimum-cost SOP expression.

P3. (15 points) Given the logic expression:

$$G(A,B,C) = (A'C + C)((CB')' + A') + (A' + A'B)(AB + C)(AB + C')$$

A. Use the theorems of Boolean algebra to simplify the formula given above into a minimum-cost expression.

B. Draw the circuit diagram for the minimized G using only AND, OR, and NOT gates.

C. Draw the circuit diagram for the simplified expression using only NAND gates.

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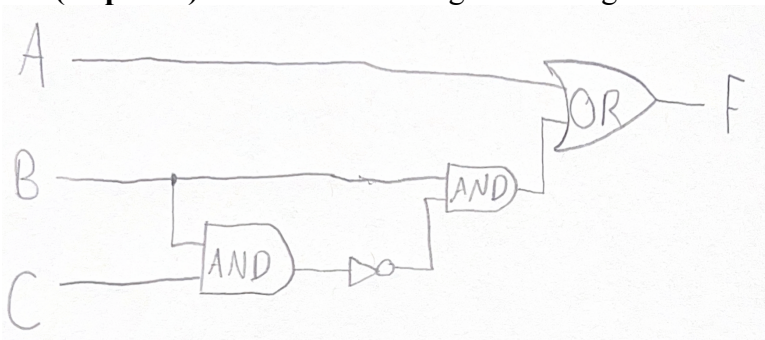
P4. (15 points) Given the following circuit diagram:



A. Write the logic expression for F.

B. Use the theorems of Boolean algebra to simplify the formula for F from A) into a minimum-cost expression.

C. Draw the circuit diagram for the minimized F using only AND, OR, and NOT gates.

P5. (15 points) Four Variable K-Maps.

A. Draw the K-map for $\mathbf{F = \bar{a}\,d + \bar{a}\,b\,\bar{d} + a\,\bar{b}\,\bar{c}\,\bar{d} + a\,\bar{b}\,c\,\bar{d}}$

B. Draw another K-map to derive the minimum-cost SOP expression for **F**.

C. Draw another K-map to derive the minimum-cost POS expression for **F**.

P6. (20 points): Minimize the following Boolean functions in SOP form:

A. $F(A,B,C,D)= \sum m(1,3,4,6,9,11,12,14)$

B. $F(A,B,C,D)= \sum m(0,1,3,4,7,8,9,11,12,13)$

C. $F(A,B,C,D)= \sum m(5,6,7,9,12,14)+ \sum d(2,3,4,10)$

D. $F(A,B,C)= \sum m(2,3,4,7)+ \sum d(1,6)$