

EEM16 Quiz 1

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TOTAL POINTS

17.5 / 20

QUESTION 1

1 (a), (b), (c) **8.5 / 10**

✓ - **1.5 pts** Incorrect conjunctive

QUESTION 2

2 (d), (e), (f) **9 / 10**

✓ - **1 pts** Essential not indicated correctly

Quiz #1

Name (Last, First): *Schwartz, Daniel*

Student Id #:

Do not start working until instructed to do so.

1. You must answer in the **space provided** for answers after every question. We will ignore answers written anywhere else in the booklet. **All pages in this booklet must be accounted** for otherwise it will not be graded.
2. This quiz is closed book/notes.
3. You may not use any electronic device.

Following table to be filled by course staff only

	Maximum Score	Your Score
TOTAL	20	

Consider the Boolean function below.

$$Y = \neg((\neg c \overset{1}{\vee} a) \overset{1}{\wedge} b) \wedge (\neg c \vee a \vee b)$$

(a) Complete the truth table:

$1 \wedge 1 = 0$

A	B	C	Y
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

Show supporting work below:

$$((\bar{c} \vee a) \vee \bar{b}) \wedge (\bar{c} \vee a \vee b)$$

(b) Write the expression for Y in Fully-Conjunctive Normal Form.

$$Y = (a \vee b \vee \neg c) \wedge (\neg b \vee c) \wedge (\neg a \vee \neg b \vee c) \wedge (\neg b \vee \neg a)$$

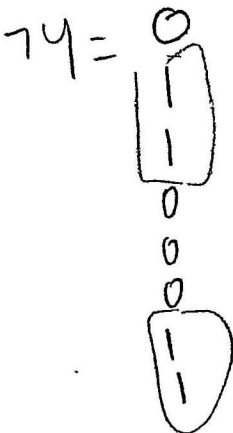
$(\neg a \vee \neg b \vee c)$

Show supporting work below:

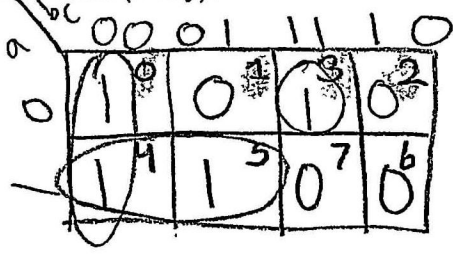
(c) Write the expression for $\neg Y$ in Fully-Disjunctive Normal Form.

$$\neg Y = (a \wedge \neg b \wedge \neg c) \vee (\neg a \wedge b \wedge \neg c) \vee (a \wedge b \wedge \neg c) \vee (a \wedge b \wedge c)$$

Show supporting work below:



(d) Draw the Karnaugh map of the truth table, circle the prime implicants, indicate which one(s) are essential (if any).



All are prime.

fully covered
 ○
 ○
 001
 x10
 11x

○ = x00 ○ = 011
 ○ = 10x

(e) Using the results in (d), write the sum-of-product expression using the fewest number of terms and literals.

$$Y = (\neg b \wedge \neg c) \vee (a \wedge \neg b) \vee (\neg a \wedge b \wedge c)$$

(f) Show a combinational circuit that implements Y (with A, B, and C as inputs) using only inverters and NAND gates.

