Nick McCullough - ID: 950337388 - Lab Section 7, noon on Fridays

CprE 281 QUIZ 3
ELECTRICAL AND COMPUTER ENGINEERING
IOWA STATE UNIVERSITY

Initial Stuff and Basics
Assigned Date: Week #04
Total Points: 60

Instructions
Complete the question below to the best of your ability. Once complete, upload a PDF of your work to canvas.

Questions

P1. (10 points) Design a 8-to-1 multiplexer using four 2-to-1 multiplexer and one 4-to-1 multiplexer.

P2. (20 points) Use Karnaugh Maps to convert the following logic expressions to a simplified SOP expression.

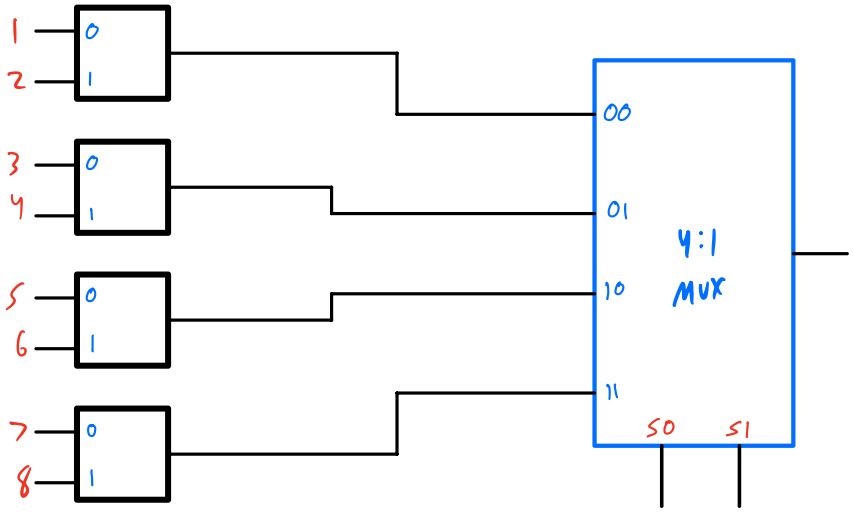
$$F(A,B,C) = \bar{A}\,\bar{B}\,C + \bar{B}\,\bar{C} + A\,\bar{B}\,C$$

P3. (30 points) A given system has three sensors that can produce an output of 0 or 1. The system operates properly when exactly one of the sensors has its output equal to 1. An alarm must be raised when two or more sensors have the output of 1. Design the **simplest circuit** that can be used to raise the alarm.

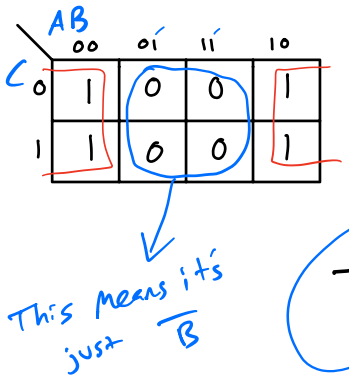
a) (10 points) Draw the truth Table.

b) (20 points) Draw the Karnaugh Maps and derive the simplified SOP expression.

P1) 8 to 1 Multiplexer using 4 2to1 Multiplexer + one 4 to 1 multiplexer



P2) $\bar{A}\bar{B}C + \bar{B}\bar{C} + A\bar{B}C$



A	B	C	f
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

P3 3 sensors, A B C, two or more sensors triggers the alarm

A	B	C	f
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

Output is 1 when 2 sensors are 1

$\bar{A}BC + A\bar{B}C + AB\bar{C} + ABC$