

## Lab 3 Answer Sheet

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### PRELAB:

Q1. Read section 3.0 and fill in the truth table below for Design 1 (*the farmer's problem*). Then use it to construct the POS expression.

Cabbage	Goat	Wolf	Alarm
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

POS Logic Expression:  $(C + \bar{G} + w)(\bar{C} + G + \bar{w})$

TA Initials: \_\_\_\_\_

# Lab 3 Answer Sheet

**Q2.** Read section 4.0 and fill in the truth table below for Design 2 (*adding the farmer*). Then use it to construct the SOP expressions.

Farmer	Cabbage	Goat	Wolf	Alarm
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

$$\begin{aligned} & \overline{F}G\overline{W} + F\overline{G}\overline{W} + F\overline{C}\overline{G}W \\ & + FCG\overline{W} \\ \Rightarrow & \overline{F}G(W+C\overline{W}) = \overline{F}G(W+C) \\ \checkmark \Rightarrow & F\overline{G}(\overline{W}+\overline{C}\cdot W) \Rightarrow \\ & F\overline{G}(\overline{W}+\overline{C}) \\ \checkmark \Rightarrow & \overline{F}G\overline{W} + \overline{F}GC + F\overline{G}\overline{W} + FGC \\ \checkmark \checkmark \checkmark \checkmark \checkmark \quad & \text{Karnaugh Map for } G(W) \end{aligned}$$

	00	01	11	10
00	0	0	1	0
01	0	0	1	1
11	1	0	0	0
10	1	1	0	0

$$\Rightarrow F\overline{G}\overline{W} + F\overline{C}\overline{G} + \overline{F}G\overline{W} + \overline{F}GC$$

Canonical SOP Logic Expression:  $\overline{F}\overline{C}G\overline{W} + \overline{F}C\overline{G}\overline{W} + \overline{F}C\overline{G}W + \overline{F}\overline{C}\overline{G}\overline{W} + \overline{F}\overline{C}G\overline{W} + \overline{F}\overline{C}G\overline{W}$

Simplified SOP Logic Expression:  $\underline{FG\bar{W} + \bar{F}G\bar{W} + F\bar{C}\bar{G} + \bar{F}C\bar{G}}$

TA Initials: \_\_\_\_\_

**LAB:**

### 3.0 Simulation results demonstrate correct code. TA Initials:

Schematic (FPGA) \_\_\_\_\_

Structural (ModelSim) \_\_\_\_\_ Behavioral (ModelSim) \_\_\_\_\_

4.0 Simulation results demonstrate correct code. TA Initials: \_\_\_\_\_