

**Quiz 2****EC262**Name: \_\_\_\_\_ **Solution** \_\_\_\_\_

Section: \_\_\_\_\_

Date: \_\_\_\_\_

**Show all work!**

1. (6 points) For the following truth table

x	y	z	f
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

- a. Find a SOP expression for  $f$  (not necessarily minimum).

$$f = x'y'z' + x'y'z + x'yz' + xy'z$$

- b. Simplify the SOP expression in 1a (2 terms, 4 literals). Show each step.

$$\begin{aligned} f &= x'y'z' + x'y'z + x'yz' + xy'z \\ &= x'z' (y + y') + y'z(x' + x) \quad P8a, P8a \\ &= x'z' + y'z \quad P5a, P5a \end{aligned}$$

- c. Find a POS expression for  $f$  (not necessarily minimum).

$$\begin{aligned} f' &= x'yz + xy'z' + xyz' + xyz \\ f &= (x'yz + xy'z' + xyz' + xyz)' \end{aligned}$$

Complement each variable then replace AND with OR and replace OR with AND  
 $f = (x + y' + z') (x' + y + z) (x' + y' + z) (x' + y' + z')$

2. (4 points) Simplify the following expression to the minimum SOP form (3 terms, 6 literals). Show each step.

$$f = w x + w y' z + w' x y + w x z + w' y' z$$

$$\begin{aligned} f &= w x + w y' z + w' x y + w x z + w' y' z \\ &= w x + y' z (w + w') + w' x y \quad P12a, P8a \\ &= w x + y' z + w' x y \quad P5a \\ &= x (w + w' y) + y' z \quad P8a \\ &= x (w + y) + y' z \quad P10a \\ &= w x + x y + y' z \quad P8a \end{aligned}$$