

ENGR-354
HW # 4 solution

1) $f = ab' + b'c + bc'$

2) SOP $f = b'c + a'b$
POS $f = (b + c)(a' + b')$

4.9. $f = x_1x_2x_3 + x_1x_2x_4 + x_1x_3x_4 + x_2x_3x_4$

4.10. SOP form: $f = x_1x_2\bar{x}_3 + x_1\bar{x}_2x_4 + x_1x_3\bar{x}_4 + \bar{x}_1x_2x_3 + \bar{x}_1x_3x_4 + x_2\bar{x}_3x_4$
POS form: $f = (x_1 + x_2 + x_3)(x_1 + x_2 + x_4)(x_1 + x_3 + x_4)(x_2 + x_3 + x_4)(\bar{x}_1 + \bar{x}_2 + \bar{x}_3 + \bar{x}_4)$
The POS form has lower cost.

4.37. Assuming that the condition where all sensors produce the output of 0 is a don't care, the complement of the desired function is

$$\bar{f} = \bar{x}_1\bar{x}_2\bar{x}_3 + \bar{x}_1\bar{x}_2\bar{x}_4 + \bar{x}_1\bar{x}_3\bar{x}_4 + \bar{x}_2\bar{x}_3\bar{x}_4$$

Then, $f = \overline{\bar{f}}$.