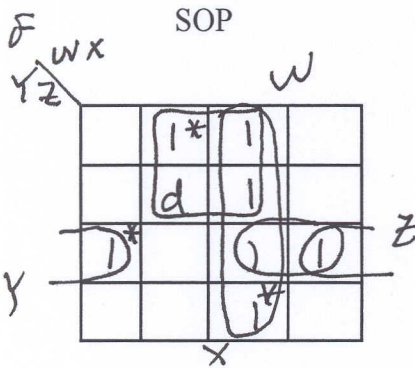


Name: Answer

**Instructions:** Answer all questions. Do NOT use any notes, book or calculator and show all work using back of page if necessary. Clearly indicate the final answer on the front of the page.

1. Find the minimal sum-of-products (SOP) and product-of-sums (POS) for part (a) and the SOP for part (b). Show all prime implements (PI) and distinguished cells. Which one of the solutions (POS or SOP) in part (a) would require fewer gates to implement? (You do not need to draw the circuits.) Are the solutions unique? Are they equal?

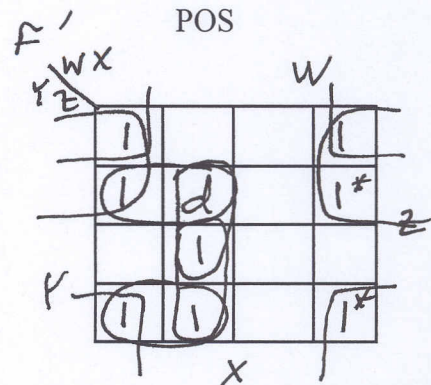
a) (10 points)  $F(W, X, Y, Z) = \prod (0, 1, 2, 6, 7, 8, 9, 10) \cdot d(5)$



\*distinguished cells

$$F = \underline{W} \cdot \underline{X} + \underline{X} \cdot \underline{Y}' + \underline{X}' \cdot \underline{Y} \cdot \underline{Z}$$

unique 4 gates



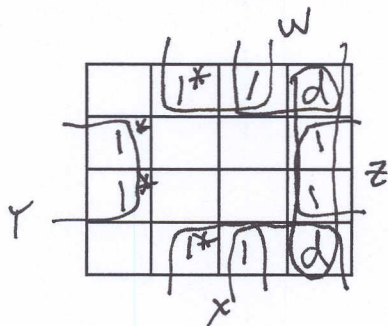
$$F' = \underline{X}' \cdot \underline{Z}' + \underline{X}' \cdot \underline{Y}' + \underline{W}' \cdot \underline{X} \cdot \underline{Y}$$

$$F = (X+Z) \cdot (X+Y) \cdot (W+X'+Y')$$

unique 4 gates

- b) (2 extra credit)

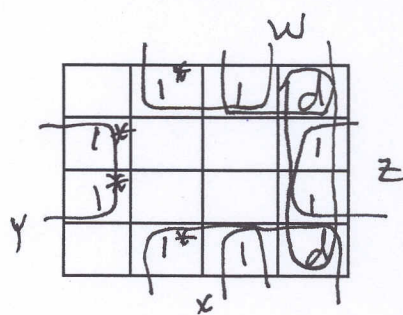
$$F(V, W, X, Y, Z) = \sum (1, 3, 4, 6, 9, 11, 12, 14, 17, 19, 20, 22, 25, 27, 28, 30) + d(8, 10, 24, 26)$$



$V=0$

$$F = \underline{X} \cdot \underline{Z}' + \underline{X}' \cdot \underline{Z}$$

unique



$V=1$