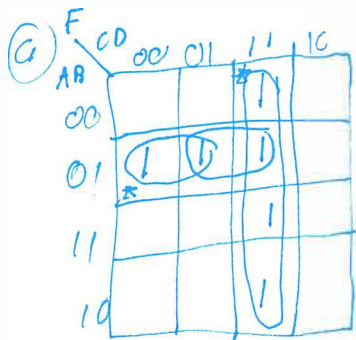


CE-1901-11 - Dr. Durant - Quiz 6
Winter 2016-'17, Week 7 Quiz

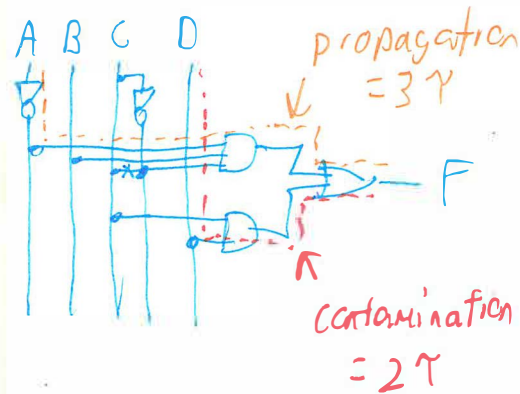
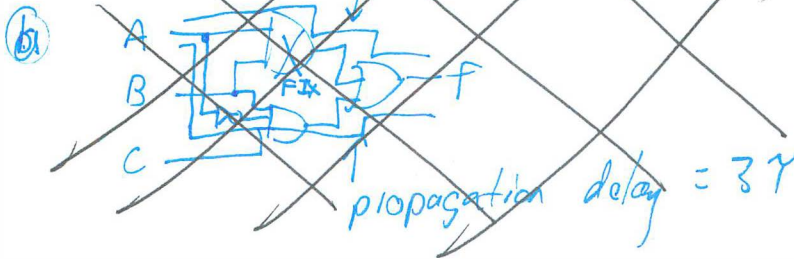
1. (6 points) Delays and Glitches

- a. (2 points) **Derive** the minimized SOP expression for $F(ABCD) = \sum_m(3,4,5,7,11,15)$. *+ draw the circuit*
- b. (1 point) ~~What~~ ^{Illustrate} path(s) of gates is involved in the contamination delay of this circuit? (illustrate in part a)
- c. (1 point) ~~What~~ ^{Illustrate} path(s) of gates is involved in the propagation delay of this circuit? (illustrate in part a)
- d. (1 point) **Determine** between which pair(s) of minterms a (1-bit input change) glitch may occur.
- e. (1 point) **Modify** the expression for F to avoid all glitches.



$F = \bar{A}B\bar{C} + \bar{A}BCD$

contamination delay = 2τ



d) 5 + 7

e) $F = \bar{A}B\bar{C} + \bar{A}B + \bar{A}BD$

↑
redundant,
eliminates glitch

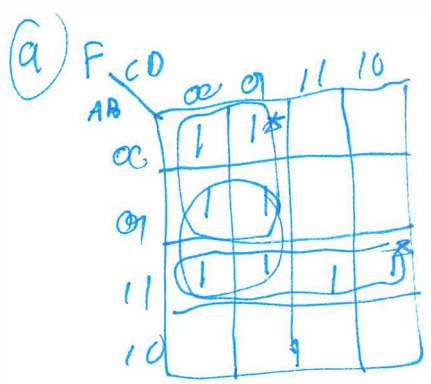
2. (4 points) **Write** the logic equation for the 8:1 MUX, $y = f(s,d)$, where s and d are 0-based vectors of appropriate length. Remember that there is a product term for each of the data terms; this product term checks all values of s to make sure they match the term's corresponding s -minterm.

$$y = \bar{s}_2 \bar{s}_1 \bar{s}_0 d_0 + \bar{s}_2 \bar{s}_1 s_0 d_1 + \bar{s}_2 s_1 \bar{s}_0 d_2 + \bar{s}_2 s_1 s_0 d_3 \\ + s_2 \bar{s}_1 \bar{s}_0 d_4 + s_2 \bar{s}_1 s_0 d_5 + s_2 s_1 \bar{s}_0 d_6 + s_2 s_1 s_0 d_7$$

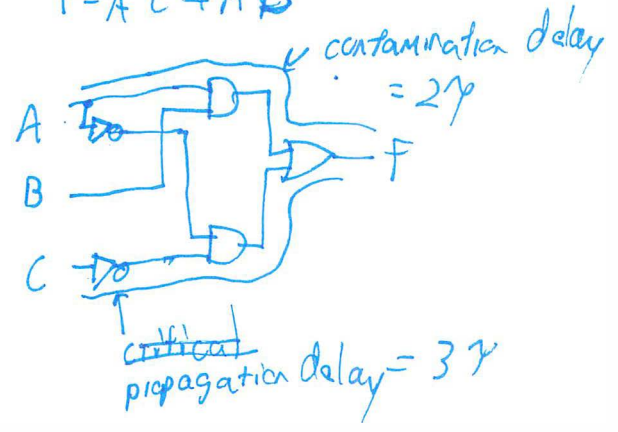
CE-1901-12 - Dr. Durant - Quiz 6
Winter 2016-'17, Week 7 Quiz

1. (6 points) Delays and Glitches

- a. (2 points) **Derive** the minimized SOP expression for $F(ABCD) = \sum_m(0,1,4,5,12,13,14,15)$. *← + draw circuit*
- b. (1 point) **What** path(s) of gates is involved in the contamination delay of this circuit? (illustrate in part a)
- c. (1 point) **What** path(s) of gates is involved in the propagation delay of this circuit? (illustrate in part a)
- d. (1 point) **Determine** between which pair(s) of minterms a (1-bit input change) glitch may occur.
- e. (1 point) **Modify** the expression for F to avoid all glitches.



$$F = \bar{A}\bar{C} + AB$$



(d) $(4 + 12) + (5 + 13)$

(e) $F = \bar{A}\bar{C} + AB + \underbrace{BC}_{\text{redundant, eliminates glitch}}$

2. (4 points) **Write** the logic equation for the 8:1 MUX, $y = f(s,d)$, where s and d are 0-based vectors of appropriate length. Remember that there is a product term for each of the data terms; this product term checks all values of s to make sure they match the term's corresponding s -minterm.

$$y = \bar{s}_2 \bar{s}_1 \bar{s}_0 d_0 + \bar{s}_2 \bar{s}_1 s_0 d_1 + \bar{s}_2 s_1 \bar{s}_0 d_2 + \bar{s}_2 s_1 s_0 d_3 \\ + s_2 s_1 \bar{s}_0 d_4 + s_2 \bar{s}_1 \bar{s}_0 d_5 + s_2 s_1 \bar{s}_0 d_6 + s_2 s_1 s_0 d_7$$