JOINT INSTITUTE
交大密西根学院

Ve270 Introduction to Logic Design

Homework 1

Assigned: September 13, 2018

Due: September 20, 2018, 4:00pm.

The homework should be submitted in hard copies.

1. Fill out the blank spaces, assuming unsigned numbers. Show steps to earn partial credits. (8 points)

   1101101.101_{2} = _____$_{10}$ = _____$_{16}$

   78.39_{10} = _____$_{2}$ = _____$_{8}$ = _____$_{3}$

2. Fill out the blank spaces, assuming 2's complement numbers. (16 points)

   -33_{10} = _____$_{2}$ = _____$_{16}$

   33_{10} = _____$_{2}$ = _____$_{16}$

   10110100101_{2} = _____$_{10}$

   $F358_{16}$= _____$_{2}$ = _____$_{10}$

3. Perform the following arithmetic operations step by step, assuming signed numbers: (12 points)

   $(6FE58C + A3DD)_{16}$ =

   $(11100 - 10001111)_{2}$ =

   $(532 - 265)_{8}$ =

4. Problem 2.14 (Boolean equation = logic equation) (4 points)

   2.14 Evaluate the Boolean equation F = a AND (b OR (c AND d)) for the given values of variables a, b, c, and d:
   (a) a=1, b=1, c=0, d=1
   (b) a=0, b=0, c=0, d=1
   (c) a=1, b=0, c=0, d=0
   (d) a=1, b=0, c=1, d=1

5. Problem 2.15 (10 points)

   2.15 Show the conduction paths and output value of the OR gate transistor circuit in Figure 2.12 when: (a) x = 1 and y = 0, (b) x = 1 and y = 1.

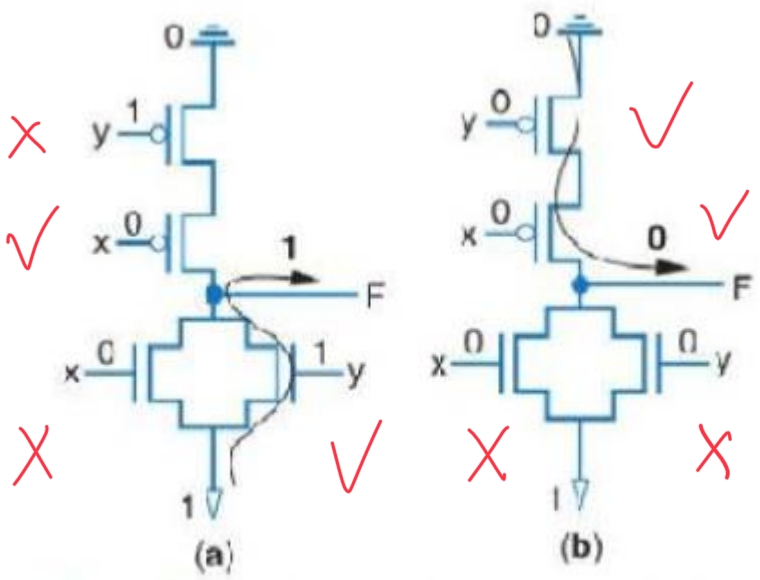


Figure 2.12 OR gate conduction paths: (a)when one input is 1, and (b) when both inputs are 0.

6. Problem 2.18 (c) (10 points)

2.18 Convert each of the following equations directly to gate-level circuits:
(a) F = a'b' + b'c
(b) F = ab + bc + cd + de
(c) F = ((ab)' + (c)) + (d + ef)'

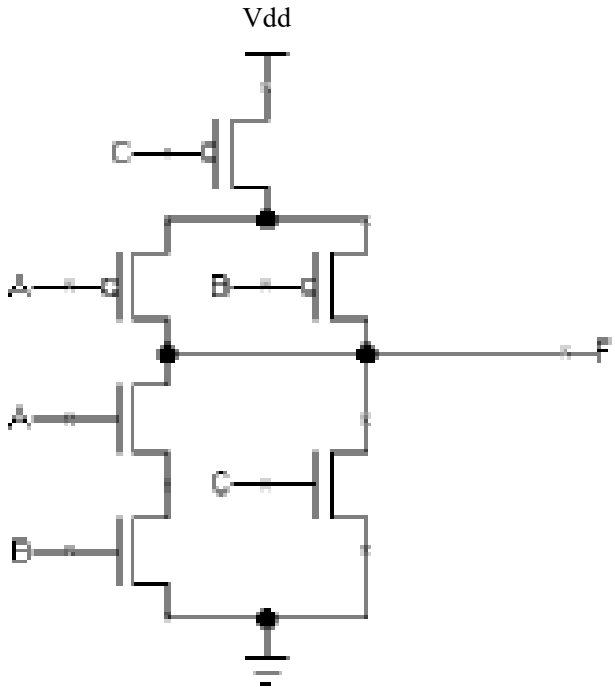
7. Problem 2.22 (10 points)

2.22 Concisely describe the following situation using a Boolean equation. We want to fire a football coach (by setting F=1) if he is mean (represented by M=1). If he is not mean but has a losing season (represented by the Boolean variable L=1), we want to fire him anyway. Write an equation that translates the situation directly to a Boolean equation for F, without any simplification.

8. Problem 2.35 (c) (d) (10 points)

2.35 Convert each of the following Boolean equations to a truth table:
(a) F(a,b,c) = a' + bc'
(b) F(a,b,c) = (ab)' + ac' + bc
(c) F(a,b,c) = ab + ac + ab'c' + c'
(d) F(a,b,c,d) = a'bc + d'

9. Build a truth table for the following circuit. (10 points)



10. Given a logic equation F = a'c + b'c' + ab, draw an output waveform for F based on the given input waveforms. (10 points)