

EE100-Electronics Homework 1

Due June 4th, 2015 @ class

Read Harris textbook, Chapter 1 & 2.

Problem 1 Given a 3-input OR gate and the input waveforms. (see Fig. 1)

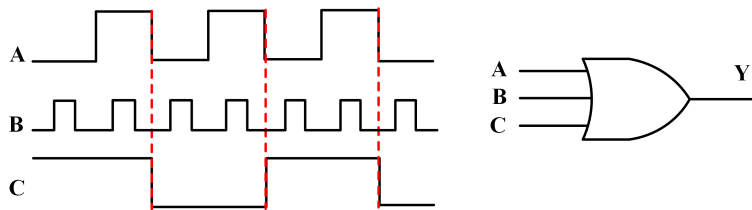


Figure 1:

(a) Draw the output waveform for the OR gate of Fig. 1.

(b) Suppose that the A input in Figure 1 is unintentionally shorted to ground. (i.e. $A = 0$). Draw the resulting output waveform.

(c) Given a statement: "If the output waveform from an OR gate is always HIGH, one of its inputs is being held permanently HIGH."

Is this statement TRUE or FALSE? If FALSE, please prove it by showing a counter example.

Problem 2 For each of the following expressions, construct the corresponding logic circuit, using AND and OR gates and INVERTERS

(a) $x = \overline{AB(C + D)}$

(b) $z = \overline{A + B + \overline{CDE}} + \overline{BCD}$

(c) $y = \overline{M + N} + \overline{PQ}$

(d) $x = (A + \overline{B})(\overline{A} + \overline{B})$

Problem 3 Given a 3-input logic circuit. (see Fig. 2)

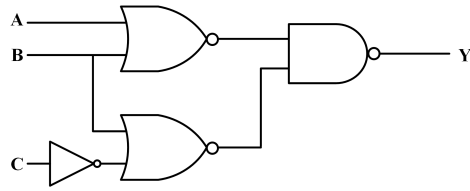


Figure 2:

- (a) Write the expression for the output of Fig. 2, and use it to determine the complete truth table.
- (b) Apply the waveforms of Fig. 1 to the circuit inputs, and draw the resulting output waveform.
- (c) Use DeMorgan's theorems to simplify the expression for the output of Fig. 2.