

Logic Design Lab EEL3712L Summer 2019 - Quiz

Instructor: Abdullah Aydeger

Student Name:

Question 1) (60 points)

- (a) Please name all the logic gates we have used in the lab.
- (b) Please write the truth tables of AND/OR gates.
- (c) How many two-input AND and how many OR gates are required to implement $Y = CD + EF + G$?
- (d) How many truth table entries are necessary for a four-input circuit?
- (e) A universal logic gate is one which can be used to generate any logic function. Which of the gate(s) we have seen in the lab is a universal logic gate? Please explain with at least one sentence.
- (f) How can you use a 2-input XOR gate to function as a 1-bit buffer/inverter? Explain by sketching the schematic diagram for each of the two cases showing the values of the CONTROL signal. Also, write down the truth table.

Question 2) (40 points)

Assume we have three input bits, A, B and C. We need to calculate $\text{NOR}(A, B, C)$. However, we can only process two input bits at a time (perform a logic operation on A and B and the result of this operation would then be processed with C). Which of the following is equivalent to

$\text{NOR}(A, B, C)$?

Hint: You can make sure both sides are equivalent by checking whether their truth tables match or not.

- a) $\text{OR}(\text{OR}(A,B), C)$
- b) $\text{NOT}(\text{OR}(\text{OR}(A,B), C))$
- c) $\text{NOR}(\text{NOR}(A,B), C)$
- d) $\text{AND}(\text{AND}(A,B), C)$

Question 3) (10 points extra)

- e) How many full adders are required to construct an m-bit parallel adder?