Homework 3 [Due at lecture on Wed, Feb 18]

Primary contact for this homework on Piazza is Sujith Surendran

Problem 1 (2 points)

Convert the following string (only the characters within the quotes) into its ASCII representation: "Hw_3". Represent each character in hexadecimal. Assume that the string is null terminated.

Problem 2 (4 points)

a. (2 Points) Write the truth table for the circuit shown in Figure 1.

b. (2 Points) Give the equation for output Z in terms of inputs A, B and C.
Problem 3 (4 points)

Given the following circuit:

a. (2 points) Fill out the truth table for Z.
b. (2 points) Give the equation for Z in terms of A and B.
c. (2 points) Draw the gate-level circuit for Z using 2-input AND/OR gates and NOT gates.
Problem 4 (8 points)

Given the logic equation \( Z = \text{NOT} (A \text{ AND} (B \text{ OR} C)) \)

a. (2 points) Fill out the truth table for \( Z \).

b. (2 points) Draw the gate-level circuit for \( Z \) using only 2-input NAND gates (Hint: DeMorgan's law).

c. (4 points) Draw the transistor-level equivalent of the circuit.

Problem 5 (6 points)

Suppose A, B, and C are inputs to a logic function which generates Z based on the following truth table:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Z</th>
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</tbody>
</table>

a. (2 points) Give the equation for \( Z \) in terms of A, B and C.

b. (4 points) Draw the gate-level circuit for \( Z \) using NOT gates and 3-input AND/OR gates.
Problem 6 (6 points)

Assume that a function F exists which takes in 3 bits A, B and C. This function generates an output Z such that:

1. \( Z=1 \) if \( A = 1 \) and \( B \neq C \)
2. \( Z=0 \) otherwise

a. (4 points) Fill out the truth table for Z.

b. (2 points) Write the logic expression for Z in terms of A, B and C.