Cpr E 281 HW01
ELECTRICAL AND COMPUTER ENGINEERING
IOWA STATE UNIVERSITY

Initial Stuff and Basics
Assigned Date: First Week
Finish by Aug. 30, 2021

Instructions

Complete the question below to the best of your ability. Once complete, upload a PDF of your work to canvas.

Questions

P1. (10 points) Define the following terms in no more than 2 sentences each.
   A. CAD
   B. PLD
   C. FPGA
   D. ASIC

P2. (10 points) In the development process initial design-simulation-verification is one loop and prototype implementation-testing-verification is another loop. Answer the following in 4-5 sentences.
   A. Which loop is relatively more expensive, and why?
   B. Can any of these loops be avoided? If not, why not? If yes, what is the penalty?

P3. (10 points) Convert the following numbers to decimal:
   A. 1111010_2
   B. 1101_2
   C. 1110_8
   D. 123_{16}
   E. CAD_{16}

P4. (10 points) Convert the following numbers to binary:
   A. 28
   B. 115
   C. 127
   D. 271_8
   E. $CODE_{16}$

P5. (10 points) Consider this array of bytes: [48_{16} 65_{16} $6c_{16}$ $6c_{16}$ $6f_{16}$ 21_{16}].
   A. Convert each byte of the array to a binary number (e.g 32_{16} = 00110010_2).
   B. Convert each binary number to an ASCII character (Refer to section 1.5.3 on pgs 14 - 16). What does it spell?

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P6. (20 points) Consider the following statement: Consider the following statement: "Today is Taco Tuesday, and you are considering ordering tacos from your favorite taco shop in Ames. If you have your mask and you **don't feel sick**, you will order takeout and eat your tacos on the way home from class. Since you love tacos, you consider ordering tacos for delivery in the evening as well. However, due to an unreasonably high minimum order you can only order with your roommates. If your roommates are hungry, and you can order before the taco shop closes, you will order delivery."

- Let the variable M represent if you have your mask.
- Let the variable S represent if you feel sick.
- Let the variable R represent if your roommate is hungry.
- Let the variable T represent if you can order before the taco shop closes.

Write all combinations of variables which will allow you to have tacos on Taco Tuesday. An example answer (use 0 for false and 1 for true):
M=?, S=?, R=?, T=?
M=?, S=?, R=?, T=?
...
and M=?, S=?, R=?, T=? will allow me to have tacos.

P7. (20 points) Consider the logic function $f(x, y) = (x \cdot y) + (x \cdot \overline{y})$
   A. (8 points) Draw the circuit diagram for $f(x, y)$
   B. (8 points) Write the truth table for $f(x, y)$
   C. (4 points) By looking at the truth table in (b), what observation can you make about $f(x, y)$

P8. (10 points) Consider the circuit below. Name the three inputs as A, B, and C and name the output as F.
   A. Write the logic expression for it.
   B. Write the truth table for the circuit.