CMPE 12/L Practice Midterm

Fall 2017

Instructions:

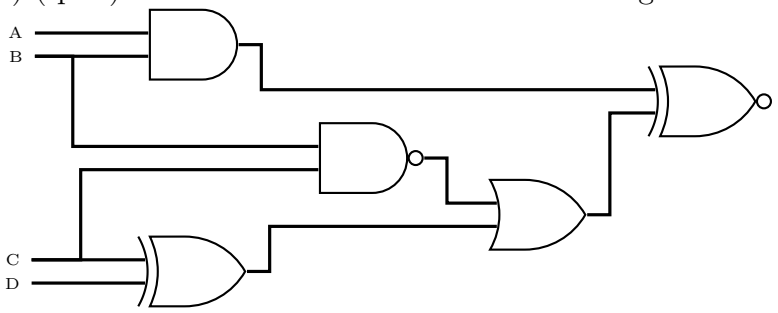
- This practice exam is based off of a previous quarters midterm. Due to the rearrangement of the class certain sections were removed. This means the length is not necessarily representative of the given midterm.
- This exam is closed book and closed notes. You may NOT use a calculator.
- Do not remove the staple.
- Always show your work in the space provided. If you do not show your work, you will not be given full credit for that problem.
- Do not use extra paper.

1) [pts] Boolean Logic:

a) (pts) Create a logic circuit (gates) for the following truth table:

A	**B**	**C**	**F**
0	0	0	**1**
0	0	1	**1**
0	1	0	**1**
0	1	1	**0**
1	0	0	**0**
1	0	1	**1**
1	1	0	**0**
1	1	1	**1**

b) (pts) Write the truth table for the following boolean circuit:



2) [pts] Binary Conversion

a) (pts) Fill in the following table by converting the given number to the other bases. Assume that each number is 8 bits. If number is un-representable by given representation indicate this. **Show your work!**

Decimal	2's complement
	10110110
	11101010
	11111011
	10100111
37	
93	
2	
-8	

b) (pts) convert 431_5 to base 3.
c) (pts) convert 431_6 to base 4.
d) (pts) convert 321_4 to base 2.

3) [pts] Binary Arithmetic

a) (pts) Perform the following arithmetic operations on the unsigned integers. Do **not** convert them to decimal first and **show your "carries"** between digits. Assume variable size is same as digits given. Indicate whether there is **overflow or no overflow**.

```
  0b 1 0 0 1 1 0 1 1
+ 0b 0 0 1 1 0 1 1 0
  0b
```

```
  0x C 1 D 2
+ 0x 2 A A 0
  0x
```

b) (pts) Perform the following arithmetic operations on the 2's complement integers. Do **not** convert them to decimal first and **show your "carries"** between digits. Indicate whether there is **overflow or no overflow**.

```
  0b 1 0 1 0 0 1 0 0
+ 0b 1 1 0 1 1 0 0 1
  0b
```

```
  0b 0 1 0 1 0 1 1 0
+ 0b1 0 0 0 1 1 1 1
  0b
```

4) [pts] MIPS Architecture

a) (pts) How many memory locations can the MIPS address?

b) (pts) What is the register size of the MIPS?

c) (pts) How many general purpose registers does the MIPS have and what are they named?

5) [pts] Binary Multiplication

Do not convert the numbers to unsigned form and flip the sign back after multiplication
a) (pts) perform -3*-7 in 4 bit 2's complement
a) (pts) perform 2*4 in 4 bit 2's complement
a) (pts) perform -1*6 in 4 bit 2's complement
a) (pts) perform 3*-5 in 4 bit 2's complement

6) [pts] Digital Logic

a) (pts) Draw the gate level diagram for a 2-4 decoder, be sure to label your circuit.

c) (pts) Using only NAND gates, show the implementations for **OR**, **NOT**, and **AND** Logic functions.

7) [pts] MIPS Coding
Small things such as pseudo-op translation and the like

7) [pts] MIPS Code Running

Given a basic code block, determine what values registers have at the end of it