Assignment 2 CS 3339 – Fall 2017 Name _____

Due: Friday, 9/22/17 @ 11:55pm netID _____

(email not long Axxxxx number)

40 points (no late grace period)

All submissions must be written in very neat handwriting and scanned (or typed) and submitted in PDF format to TRACS with the filename of A2_netID.pdf. You may submit as many times as you like prior to the deadline; only the most recent submittal will be graded. All assignments must be submitted individually and reflect your own work; however, I encourage you to work in groups and discuss the problems with your classmates.

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1) [4 points] Despite its flaws, the x86 ISA has shown incredible resiliency, largely due to binary backwards compatibility. Why is binary backwards compatibility so important? Given this, what allowed the increase in popularity of the ARM ISA in the last decade?

2) [4 points] If I shop at Fry's, Digikey, Mouser, etc for electronic parts I can buy the latest i7 Intel processor chip but I cannot buy the latest ARM cortex processor chip – why not?

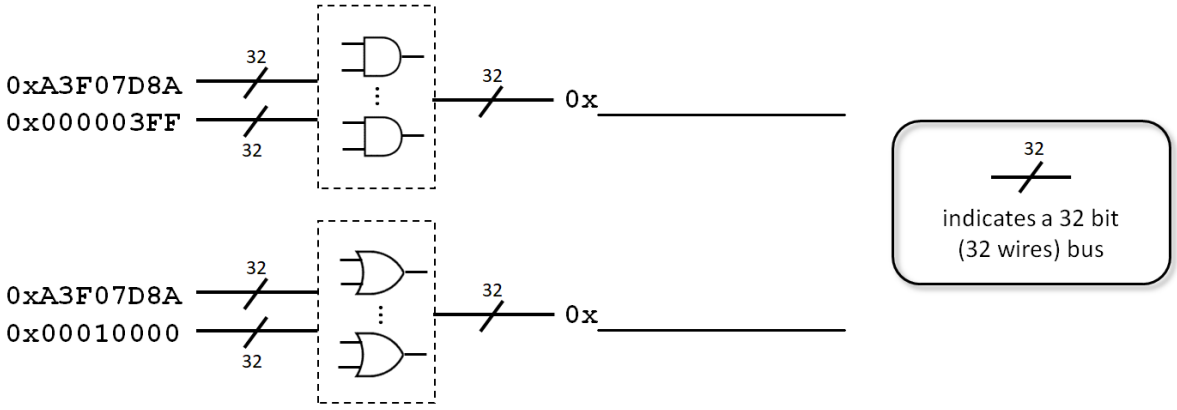
3) [4 points] Divide the unsigned value 0x8eb5_743c by 4 using a bit-shift. Express the result in hexadecimal. (Hint: Don't use a calculator; you won't have one on the exam).

4) [4 points] An array of 4-byte ints begins in memory at address 0x1000_8000 and this address is stored in $s0. Provide the MIPS assembly instruction to store the 3rd element of the array into $s1.

5) [4 points] Many x86 instructions require the destination register to also be one of the source registers. Why? (i.e., what is the benefit of requiring this?)

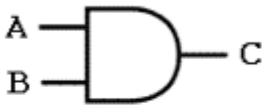
6) [4 points] If the MIPS designers wanted to increase the register set to 128 registers, what tradeoffs would be necessary for I-type instructions?

7) [4 points] The dashed boxes represent logic blocks that perform bitwise operations on 32 bit values per the symbol shown. Given the two 32 bit inputs what will be the output in hexadecimal format?



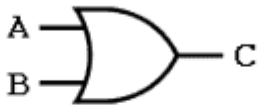
8) [4 points] Given the following truth table and circuit diagram complete the truth table with binary counting of the inputs and fill in the output values.

AND



Inputs		Output
A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

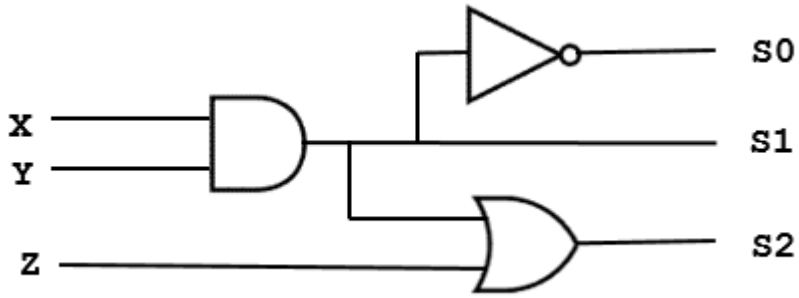
OR



Inputs		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

NOT

Input	Output
A	C
0	1
1	0



X	Y	Z	S0	S1	S2
0	0	0			
0	1	0			
1	1	0			
1	1	1			

9) [8 points] A MIPS binary has the following address and instruction data values. Write the assembly code for this instruction. Show your steps and put the answer in the same format as Project 1.

addr = 0x0040_0054 instr = 0x1360_0004