First Name Last Name
Student ID: Student ID

CS-343 Exam 1

March 2, 2010
Exam ID: Exam ID

Instructions:

- For multiple choice questions, circle the letter of the one best choice unless the question explicitly states that it might have multiple correct answers.
- There is no penalty for guessing, so answer all questions.
- Place drawings where indicated in the question; be sure to put the question number next to your drawing; use pencil rather than ink.
- Unless otherwise indicated, all questions count equally; but questions with multiple parts count more.
- No electronic devices of any sort may be used for any reason during the exam.

1. Is it all right to use a phone, calculator, or any other electronic device during this exam?
   A. Other people can't, but I'm different.
   B. Only if the professor isn't looking.
   C. Yes, as long as the phone is set to vibrate.
   D. iPhones are okay, but Blackberries are not.
   E. No.
2. I am thinking about my birthday. *How many yes/no questions* would you have to ask me to find out **which month** I was born in?
   A. 12
   B. 6
   C. At least 3, but possibly 4.
   D. At least 4
   E. $\log_2(2^{12})$
3. Now you have to guess everyone's birth month. What is the *average number of yes/no questions* you will have to ask everyone?
   A. 12
   B. 6
   C. $\lceil \log_2(12) \rceil$
   D. $\log_2(12)$
   E. $\log_2(2^{12})$
4. If someone says, "A is two orders of magnitude larger than B," what is the most reasonable way to interpret this statement?
   A. A is twice as large as B.
   B. A is approximately 100 times larger than B.
   C. A is exactly, or very close to, 200 times larger than B.
   D. A is approximately 2,000 times larger than B.
   E. A is approximately equal to B plus 200.
5. 25 nsec = _____ μsec.
   A. 25,000
   B. 0.025
   C. 25,000
   D. 0.000 025
   E. 2.5

6. What is the *period* of a 4 GHz signal?
   A. 4,000,000 Hz
   B. ¼ sec
   C. ¼ msec
   D. ¼ μsec
   E. ¼ nsec
7. What is the *frequency* of a signal with a period of 0.5 sec?
   A. 0.5 Hz
   B. 0.5 Hx
   C. 2.0 Hx
   D. 2.0 Hz
   E. 500 msec
8. What is the *period* of a signal with a period of 50 psec?
   A. 0.050 sec
   B. 0.000 050 sec
   C. 0.000 000 050 sec
   D. 0.000 000 000 050 sec
   E. 0.000 000 000 000 050 sec
9. What is the *average* of 80 7's, 10 9's, 5 4's, 3 2's, and 2 5's? (*Remember, no calculators allowed.)*
   A. 102.5
   B. 3.9
   C. 0.19
   D. 6.86
   E. 31.4
10. What is the *sum of the weights* for the weighted average in the previous question?
    A. 270
    B. 100
    C. 686
    D. 314
    E. 98.6
11. What is the *rotation speed* of a tire that has a period of 100 msec?
    A. 55 MPH
    B. 6,000 KHz
    C. 6,000 RPM
    D. 600 KHx
    E. 600 RPM
12. Ben and Jerry's stacks ice cream on palettes (wooden platforms) with 16×8 rectangles of half-gallon containers 32 layers high on each palette. *How many gallons* of ice cream go on a palette? (*Hint: there are 2^1 half gallons in a gallon!)*
    A. 11
    B. 2^{11}
    C. 5,280
    D. 2^{56}
    E. 0.0002

13. A computer monitor is 2,048 pixels wide by 1,024 pixels high. Each pixel of this monitor requires 4 bytes of information to be drawn. What would be the *bandwidth* needed to supply all the information needed to redraw the entire screen 64 times per second? (bps = bits per sec; Bps = Bytes per sec)
    A. 2^{29} Bps
    B. 2^{32} bps
    C. 512 MBps
    D. 4 Gbps
    E. All of the above
14. The same program is run on computers A and B. Computer A is 1.5 times faster than B. Computer A took 10 seconds to run the program. *How long* did computer B take?
    A. 5 seconds
    B. 10 seconds
    C. 15 seconds
    D. 20 seconds
    E. 3.8 nsec
15. Write this question number on the back of an exam sheet, and write the truth table for a full adder next to it.
16. Write this question number on the back of an exam sheet, and write the truth table for the function $y = \overline{a}\overline{b}c + \overline{a}bc + a\overline{b}\overline{c} + a\overline{b}c$
17. Write this question number on the back of an exam sheet, and minimize the function from the previous question using a Karnaugh Map. Show all work.
18. Write this question number on the back of an exam sheet, and draw the gates to implement the *minimized* function from the previous question.
19. **This question doesn't count: I just want to see how many people know the answer.** What is a name for the two-variable function with *minterms* 1 and 2? (Just guess if you don't know.)
    A. AND
    B. OR
    C. NAND
    D. NOR
    E. XOR
20. Write this question number on the back of an exam sheet, and draw all the AND, OR, and NOT gates to implement a *4×1 multiplexer*. Label all inputs and outputs appropriately.
21. *Fill in* the missing cells **in binary** for the two-bit adder from *Assignment 2*.

A	B	Cin	Cout	Sum
00_2	11_2	0_2		
10_2	10_2	1_2		
01_2	00_2	1_2		

22. *Fill in* the missing cells, **using hexadecimal for the Result column** for the four-bit adder-subtracter from *Assignment 3.* (Table on next page.)

sub (switch 8)	A	B	Cout	Overflow	Result
0	6_{16}	A_{16}			
1	C_{16}	7_{16}			
0	5_{16}	2_{16}			

23. In Assignment 4, the *condition_code[3..0]* array was used for the C, V, N, and Z outputs of the ALU. Use a short phrase to *define each*:

condition_code[3] (C) _____

condition_code[2] (V) _____

condition_code[1] (N) _____

condition_code[0] (Z) _____

24. *Fill in* the missing cells **in hexadecimal** for the four-bit ALU from *Assignment 4.* **Show your work below the table for possible partial credit.** For AND and OR, only the N and Z bits matter for an answer to be considered correct; you can leave C and V at zero for those rows.

A	B	function_code	condition_code	Result
0	0	1		
3	A	2		
3	A	6		
1	F	0		
3	C	C		