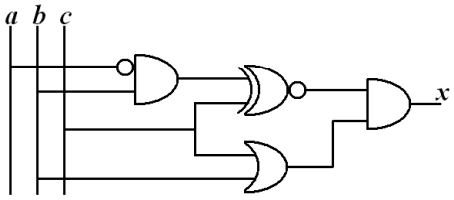
1. [10] Simplify the following circuit. (Use binary gates only, and as few as possible.)



2. [15] Design a circuit that takes as input a 4-bit binary number $x_3x_2x_1x_0$, and computes a 1-bit output y, such that $y = \top$ if and only if the input is a prime number. Make the circuit as readable as you can. (Note: Prime numbers between 0 and 15 are 2, 3, 5, 7, 11 and 13.)

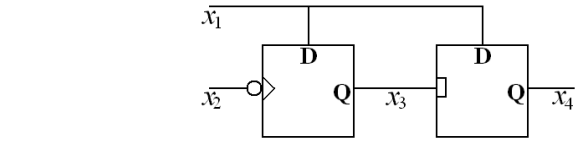
3. Do the following conversion.

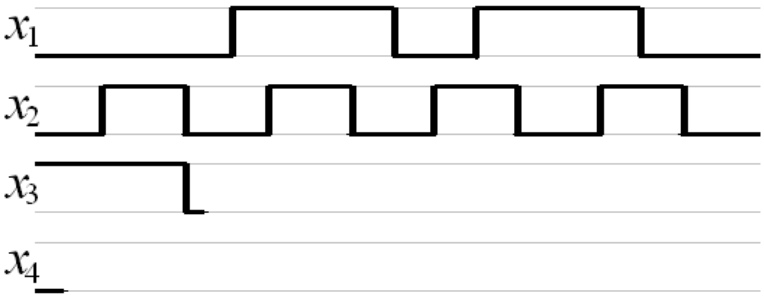
(a) [5] Convert decimal number 22.3 to binary (ordinary binary with a binary point, not IEEE).

(b) [5] Convert 22.3 from base 5 to decimal. (Base 5 is a numbering system where each digit can take values 0, 1, 2, 3 and 4. For example, 12 in base 5 is 7 in base 10.)

(c) [5] Convert the 8-bit two's complement number 11001100 to decimal.

4. [10] Complete the timing diagram for signals x_3 and x_4 based on the circuit.





CSC258 Computer Organization (Winter 2009)
Mid-Term Test

Febrary 23, 2009

50 minutes, 4 questions, 50 marks.

FAMILY NAME:

GIVEN NAME(S):

STUDENT ID:

TUTORIAL ROOM (circle one): BA2135 / BA2139 / BA2165

Question#	Marks
1	/10
2	/15
3	/15
4	/10
Total	/50