CPE355 - Real time embedded kernels - Spring'11
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Homework Assignment #2
Due Date: Thursday, January 27th 2012

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1) With any number of 2-to-1 MUX gates, implement the following gates:

a. NOT
b. NAND

2) What is the difference between a latch and a flip-flop?

3) Given a digital system with VDD = 1.8V, and an analog-to-digital threshold T = 1.0V such that $x<T \Rightarrow 0$ and $x > T \Rightarrow 1$. Sketch the input/output relation ship for $0 \leq Vin \leq 1.8V$ where Vout = 0V for '0' and Vout = 1.8V for '1'.

4) Given the system in problem 3, state the bit that is mapped to from each voltage.

(a) 0.1V
(b) 1.73267589V
(c) 0.99V
(d) 1.01V

5) Given $0111011011010001100110111111110000_2$, determine the equivalent number in each base.

(a) Decimal
(b) Hexadecimal

6) Given 24687531_{16}, determine the equivalent number in each base.

(a) Decimal
(b) Binary

7) Given 24687531_{10}, determine the equivalent number in each base.

(a) Hexadecimal
(b) Binary

8) In class, we did not deal with bases besides 2, 10 and 16. However, if you can represent a number in these three bases, you should be able to have a general understanding on how to do it for all the other bases. Perform the following conversions and don't forget to show your work and check your results with *wolfram alpha*.

a) 10_{10} to base 7

b) 32_{4} to base 5

c) 1010_{2} to base 11

d) 15_{6} to base 2

9) Using 8-bit bytes, show how to represent 123_{10} and -123_{10}. Simply indicate the case if the code is not able to represent the information.

a) Unsigned integer

b) Two's complement

c) BCD

d) ASCII

10) Using simple precision floating point show that adding 0.5_{10} and 3.5_{10} in binary will yield 4_{10} in binary.