

# Introduction to Computer Engineering (E85)

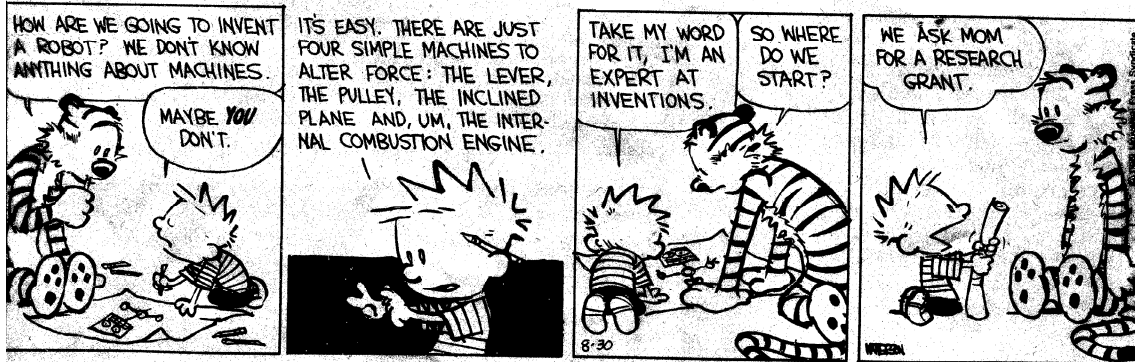
Harris

Fall 2010

Problem Set 6

Due: Wednesday, October 27

**CALVIN AND HOBBS** • Bill Watterson



## 1) Textbook Problems

Do problems 5.27(a), 5.26(a), 5.29(b), 5.44(a-b), 5.48, 5.50(a,b,d,i),

## 2) Transmission Lines

A Clinic team proposes to drive a 45 cm wire on a printed circuit board connecting the output buffer of one chip to the input buffer of a second chip. The PCB wire has a  $50 \Omega$  characteristic impedance and a velocity of half the speed of light. Each buffer has a  $5 \Omega$  effective output impedance and an  $100 \text{ M}\Omega$  effective input impedance. The buffers use LVCMOS signaling described in Table 1.4. The first buffer switches from 0 to VDD at time 0.

- Draw a model of the circuit similar to Figure A.19.
- What is the steady state voltage at the input of the second chip?
- Plot the voltages at the input of the second chip vs. time for the duration of interesting behavior.
- If the signal serves as the clock input of the second chip, what might go wrong?
- If the signal serves as a data input to the second chip, what might go wrong?
- How could the Clinic team avoid these problems?

## 3) Time

Please indicate how many hours you spent on this problem set. This will not affect your grade, but will be helpful for calibrating the workload for next semester's class.