Tutorial 1
Computer Systems 2

This tutorial is based on the first few lectures, now available on Moodle.

The objective of this tutorial is to practise how to "hand simulate" small digital circuits in order to understand their logical operation, abstraction and practical operation/properties in terms of gate propagation delays.

1. Word out the complete truth table for the 1-bit multiplexor (the mux1 circuit) by simulating the circuit for all possible input values. Compare your results with the table given in Lec 2 Slide 13.
2. Draw a diagram of mux2, using mux1 as a black box (i.e. don't draw all the individual logic gates). (See Lec 2 Slide 19.)
3. Draw a diagram of mux2, using mux1 as a white box (i.e. do show all the individual logic gates). (See Lec 2 Slide 19.)
4. Simulate mux2 for several choices of inputs, and check to see that it's working properly. (See Lec 2 Slide 19.)
5. Give a convincing reason that a truth table is not a very good way to define the behavior of the mux2 circuit, although a truth table worked well for mux1.
6. Simulate a 4-bit ripple carry adder as it adds 5+3. (See Lec 2 Slide 23.)
7. Work out the gate delay of the 4-bit adder circuit (see Lec 2 Slides 22—23 and Lec 3 Slides 15--17).