Due at the start of class Monday, November 17, 2003.

Problem 1. Use a 2-to-4 decoder and an OR gate to implement the exclusive-OR of two inputs A and B.

Problem 2. Draw a circuit for a four-bit register with the following operations:

Input 00: Clear the bits.

Input 01: Load the bits.

Input 10: Left shift 1 bit.

Input 11: Right shift 1 bit.

You must use D flip-flops for the four registers. Other than that you may use multitplexers, decoders, etc. (as black boxes), along with the standard gates (AND, OR, NAND, NOR, NOT, XOR).

Problem 3. Assume you wanted to build a circuit with the same operations as in Problem (2), but using T flip-flops for the registers instead of D flip-flops. The two internal registers and their associated hardware will be the same. (The two endpoints are slightly different because of the shifts.) Draw just one internal register and its associated hardware.

Problem 4. Assume you have logic that allows three values (trits) 0, 1, or 2. Assume all gates in this logic have two inputs.

(a) What (two-input) gates would you like in order to make a trinary adder. In other words, for what functions would you like gates.

(b) Draw a trinary half adder using these gates.

(c) Now draw a trinary full adder.