Introduction to Computer Engineering (E114)

Harris Spring 1999

Problem Set 2 **Due: Friday, February 5**

1) Numbers

a) Convert 10100_{10} to binary. b) Convert 10100_2 to decimal.

b) Convert $B0BB1E_{16}$ to decimal. c) Convert 123456_{10} to hexadecimal.

2) J-K Flip-Flop

The J-K flip-flop was evidently once popular among logic designers. It is not particularly efficient to construct out of CMOS transistors, so has fallen out of favor except as a means of plaguing students. The J-K flip-flop has three inputs J, K, and CLK; and one output Q. On the positive (rising) edge of CLK, the output Q may change according to the following truth table:

J_n	K_n	Q_{n+1}
0	0	Q_n
0	1	0
1	0	1
1	1	NOT Q_n

a) Construct a J-K flip-flop using two D latches and some logic gates.

b) Construct a D flip-flop using a J-K flip-flop and an inverter.

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.