

RUTGERS UNIVERSITY  
Department of Electrical and Computer Engineering  
14:332:479 Concepts in VLSI Design  
Assignment V  
Assigned: November 16, 2005  
Due November 22, 2005

**Reading Assignment:** Chapter 6 of Weste and Harris.

No collaboration is permitted on this assignment. Your work must be your own. You must turn in these specific items for each question to receive credit:

- Cadence logic schematic.
- Cadence Verilog logic simulation.
- Cadence switch-level schematic.
- Cadence Spectre switch-level simulation.
- Cadence layout.
- Cadence Spectre mode simulation for the layout.

1. **(Dynamic Domino CMOS Logic Design.)** Implement the Boolean function

$$H = (A + (B \cdot C \cdot E) + F + G) \quad (1)$$

in CMOS dynamic  $n$ -Domino logic (see the schematic in Figure 6.28 (a)). Assume that when the clock  $\phi$  is low, the logic output is precharging to logic 1 and when  $\phi$  is high, the logic output is evaluating (this is done by the  $n$ -tree).  $\phi$  is the only clock signal you will need. Keep in mind that the precharger is an  $p$ -FET and the evaluator is an  $n$ -block. Watch out for logic errors! Include an output inverter in this design, include a footer, and include a keeper. Turn in all of the things asked for at the start of this assignment. Would this gate be faster if it were implemented in  $p$ -Domino logic? If so, why? If not, why not?

2. **(Clocked Dynamic CMOS Logic.)** Implement the Boolean function

$$J = \overline{((A \cdot B) + (C \cdot D) + E + F) \cdot G} \quad (2)$$

as dynamic clocked CMOS logic C<sup>2</sup>MOS. Turn in all of the things asked for at the start of this assignment.