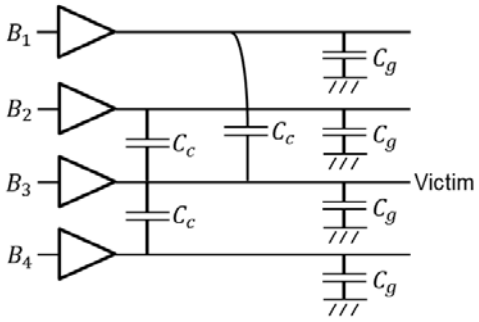
Homework Assignment 7

(Due Apr. 6th at the beginning of the class)

1. [Wire Coupling, **10 points**] Calculate effective capacitance for the victim net and transition patterns in the following figure.



Transition patterns ($B_1B_2B_3B_4$)	Effective cap. of the victim net
0000 → 0010	
1101 → 0010	
0101 → 1010	
0011 → 1100	
0100 → 1111	
1010 → 0101	

2. [Coupling Minimization, **20 points**] Encode 25 using the FPF-CAC Encoding algorithm in the lecture note (m=7). Show all the details, i.e., v, f_k, d_k, r_k, etc. at each step.

3. [Buffer Insertion, **30 points**] In the second buffer insertion problem in the lecture note (pp. 34 – 37), we did not take the buffer delay into account. However, the buffer delay is not negligible in reality. Suppose the Elmore delay of a buffer is d. Find N, the number of buffers to insert.
   - [Hint] Add d to τ_k in slide 35. Then, derive τ_{all}. Differentiate τ_{all} with respect to s_k and find a relationship among s_1, s_2, …, and s_N. Then, rewrite τ_{all} as a function of R_{DR}, N, C_{in}, C_w, R_w, and d. Differentiate τ_{all} with respect to N and set it to 0 to find N.