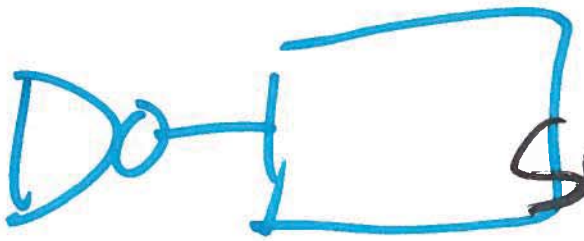
EE 421/ECG 621

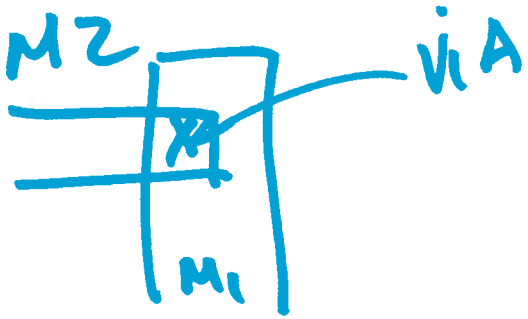
Digital IC Design

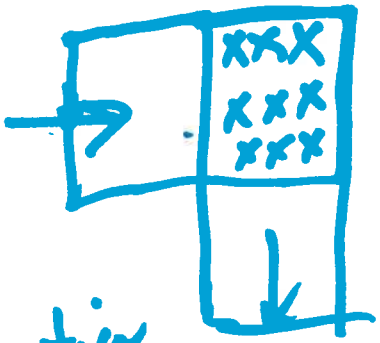
Lecture 5



Sept. 14, 2016

$P = I^2R$

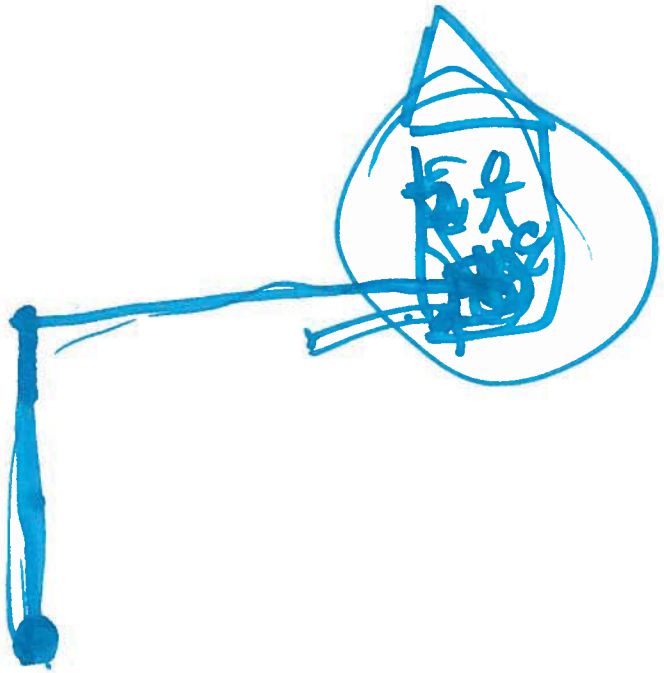


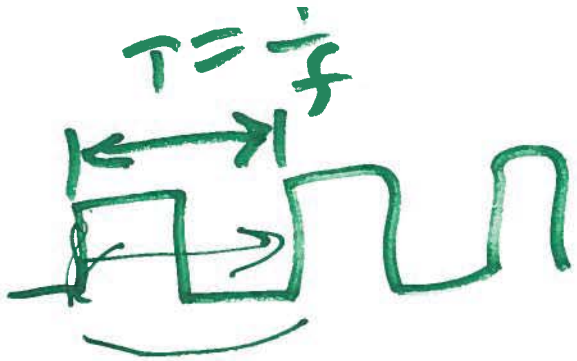


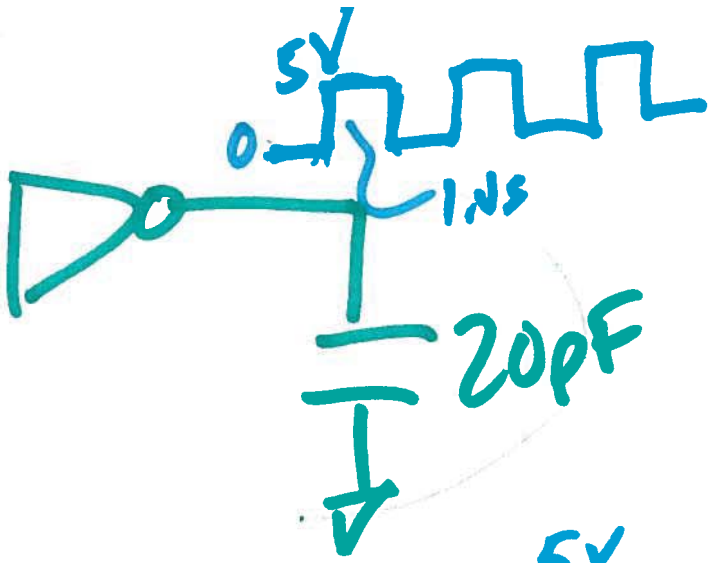
electromigration

Al

1 mA/μm

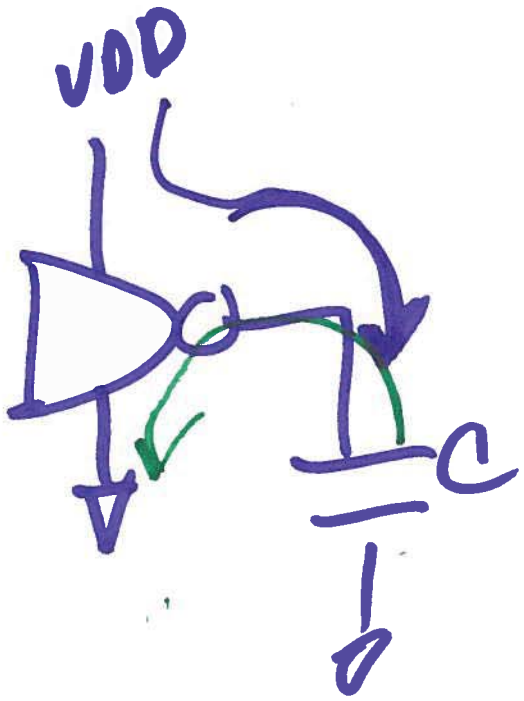




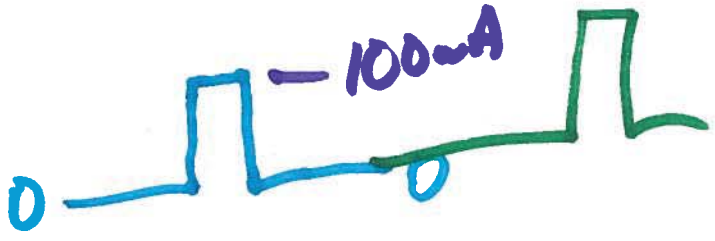


$$I = C\frac{dV}{dT} = C\cdot\frac{\Delta V}{\Delta t}$$

$$CV = Q$$



$$20p \cdot 5 = 100pC$$



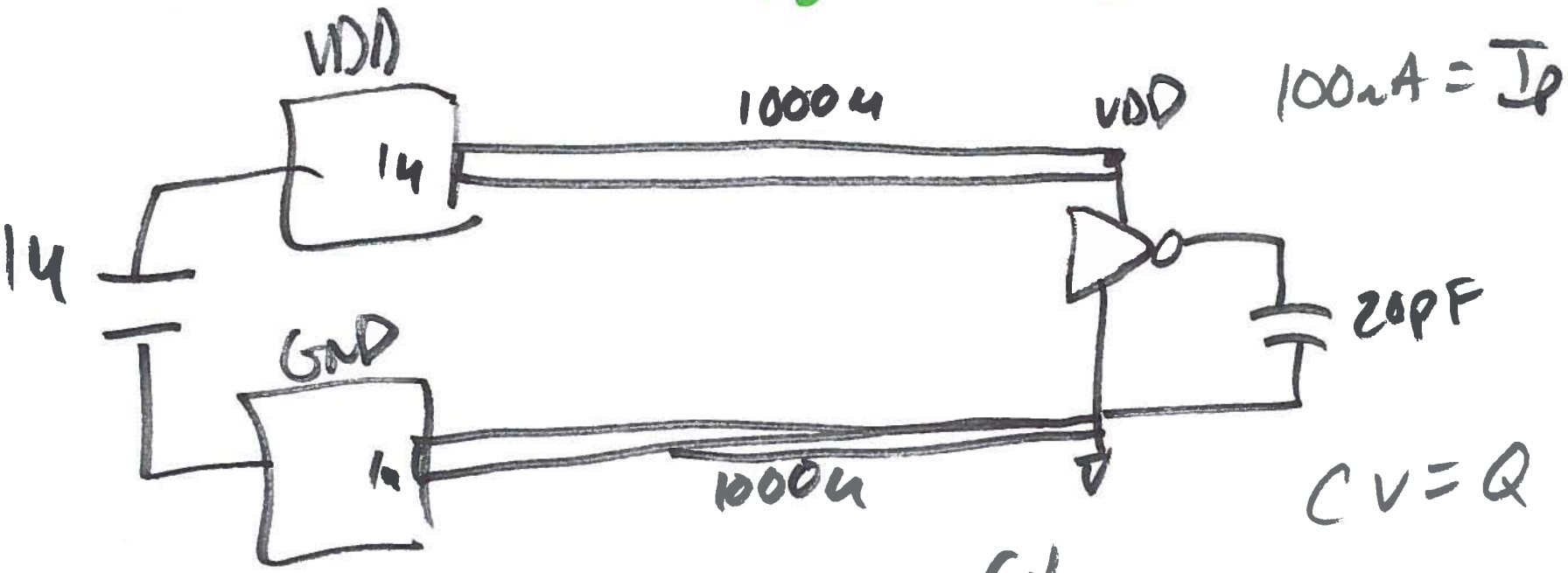
$$I_{peak} = \frac{100pC}{1ns} = 100mA$$

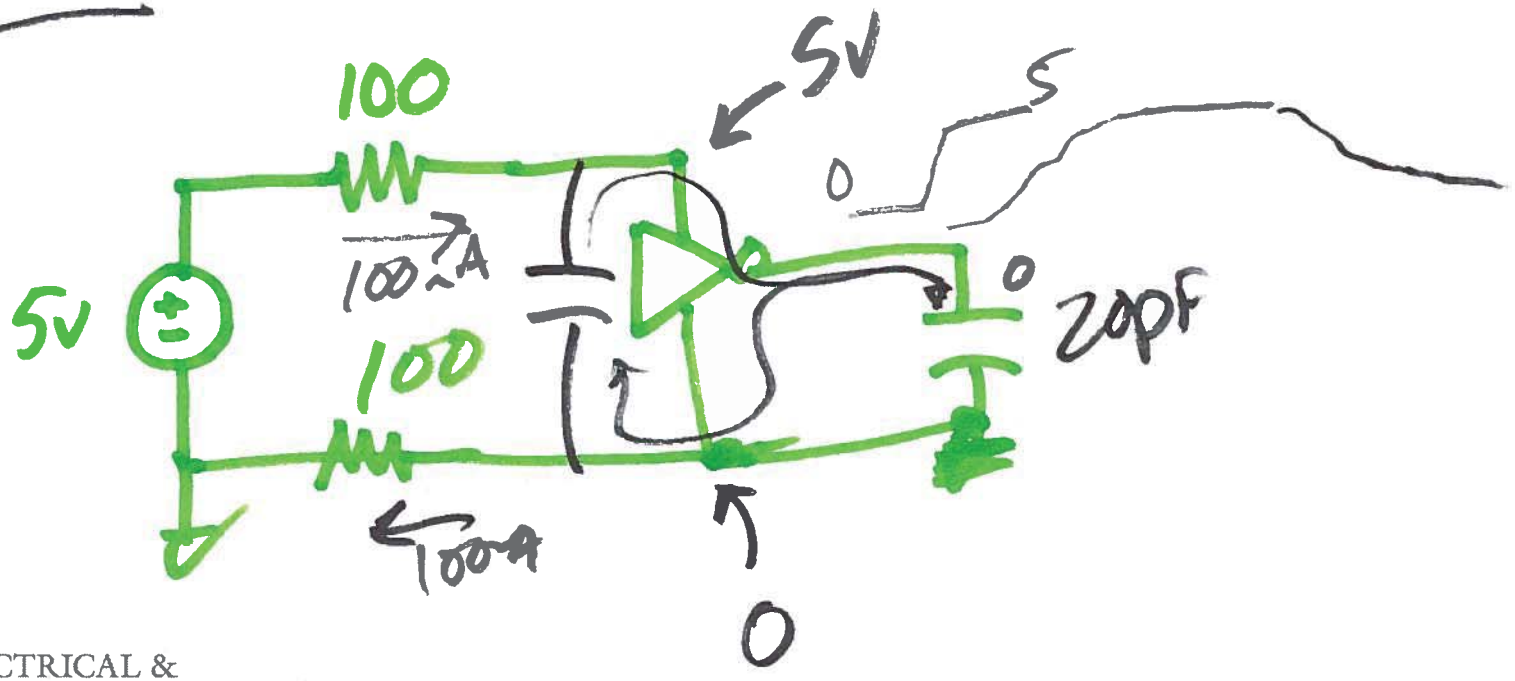
$$I_{INV} = \frac{100pC}{T} = 100pC \cdot f$$

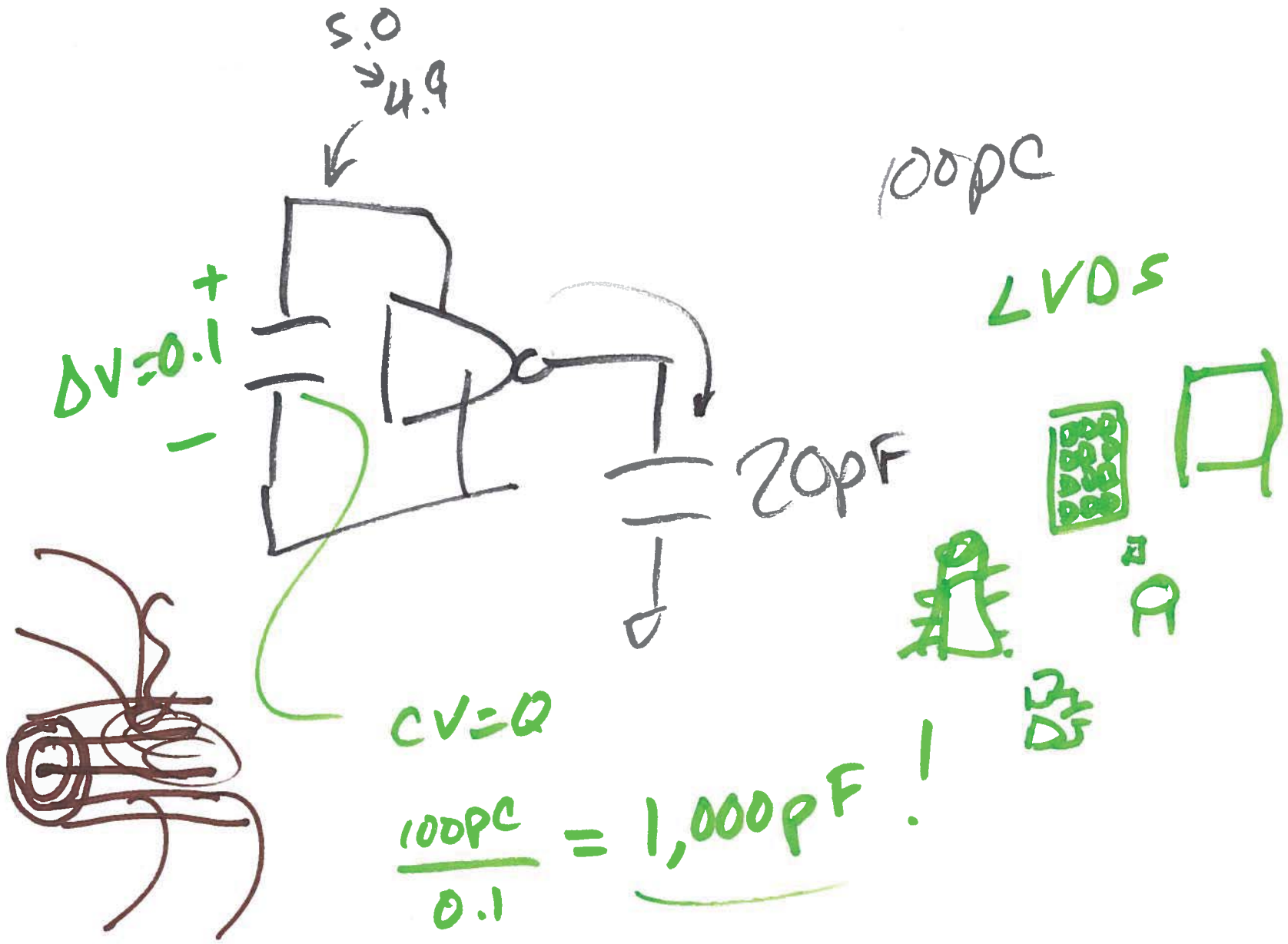
$$C \cdot VDD \cdot f$$

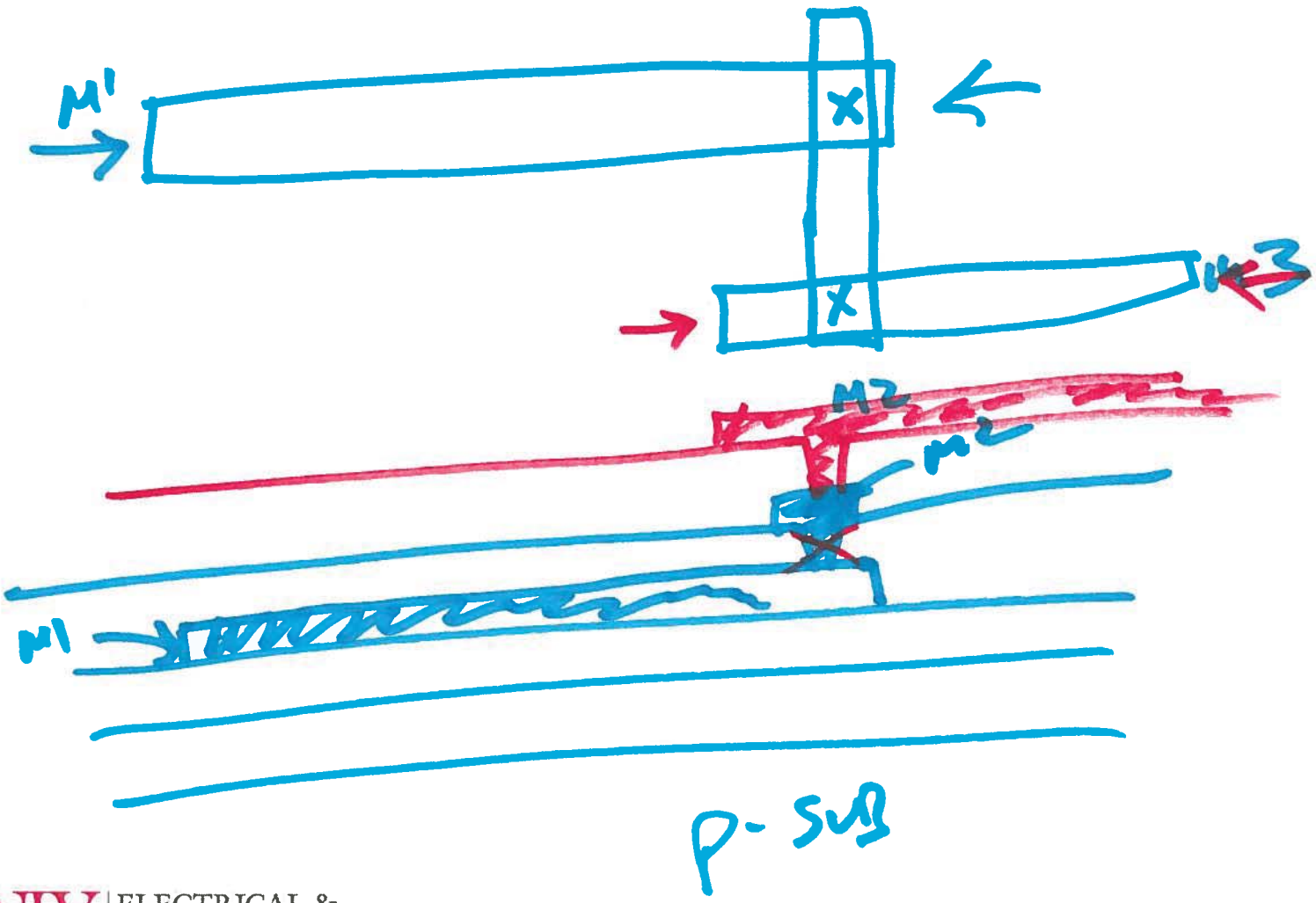
$$P_{INV} = VDD \cdot I_{INV} = C \cdot VDD^2 \cdot f$$

$R_D = 0.1254\Omega$






5.0
4.9
100pC
ΔV=0.1
+
−
20pF
LVDS
CV=Q
100pC / 0.1 = 1,000pF !


M1
M3
M2
M2
M1
P- Sub