

EE421/ELG 621

Digital IC

Lecture 17

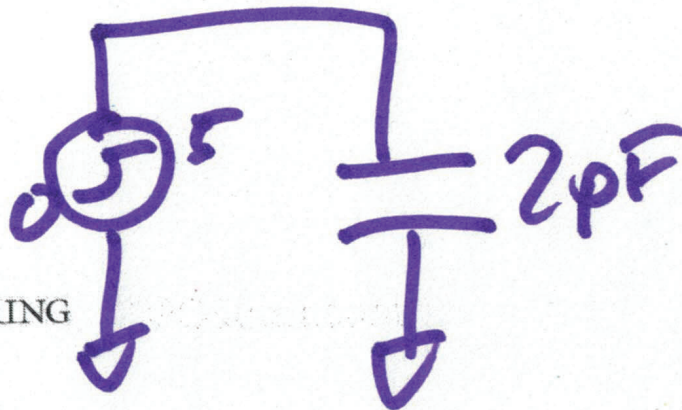
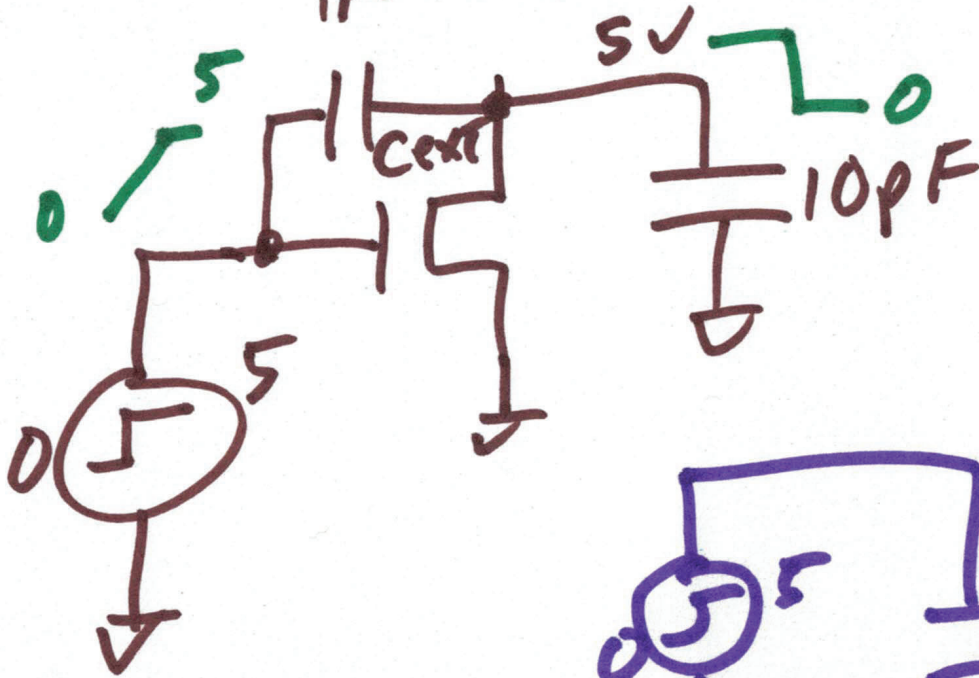
1pF OCT. 26, 2020

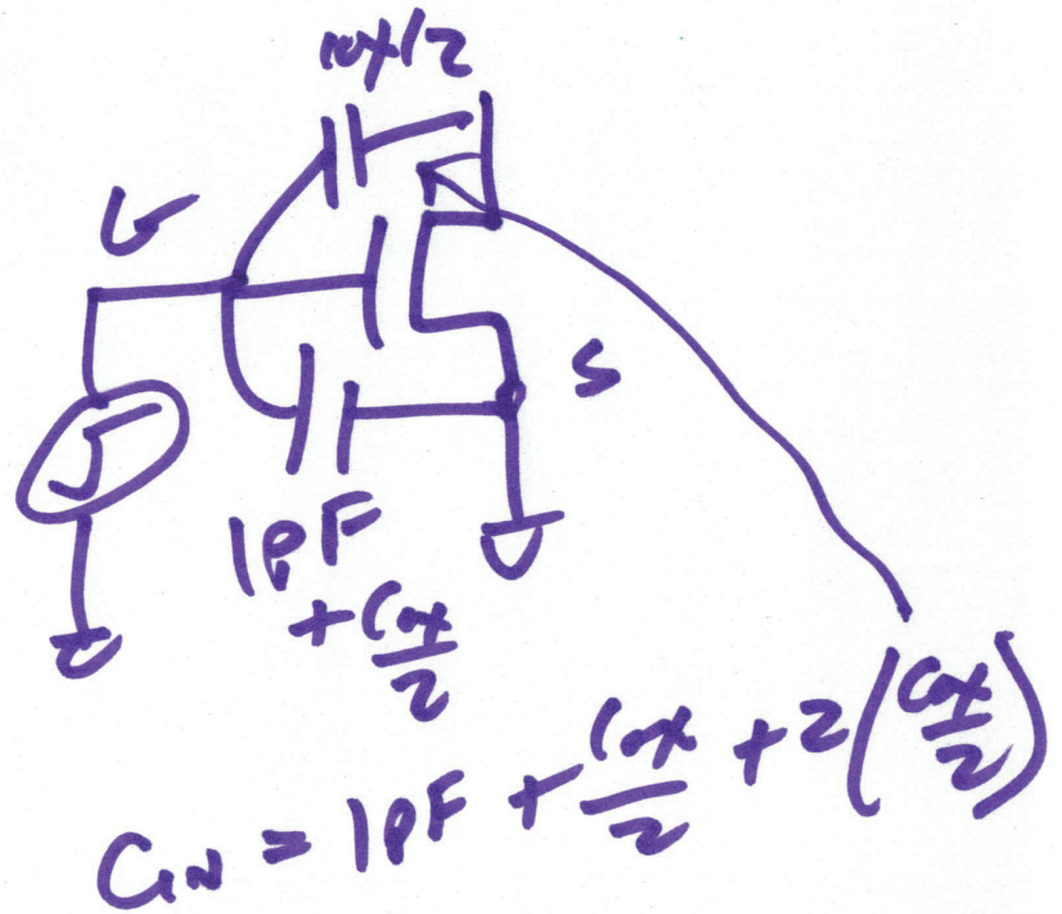
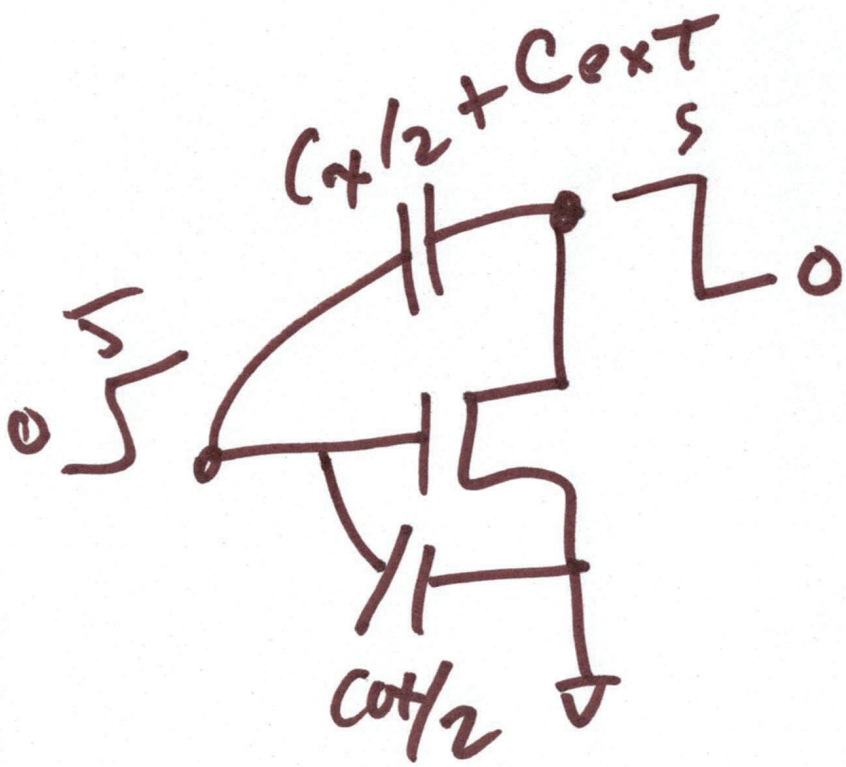
(0-5) 1pF = before

(5-0) 1pF = after

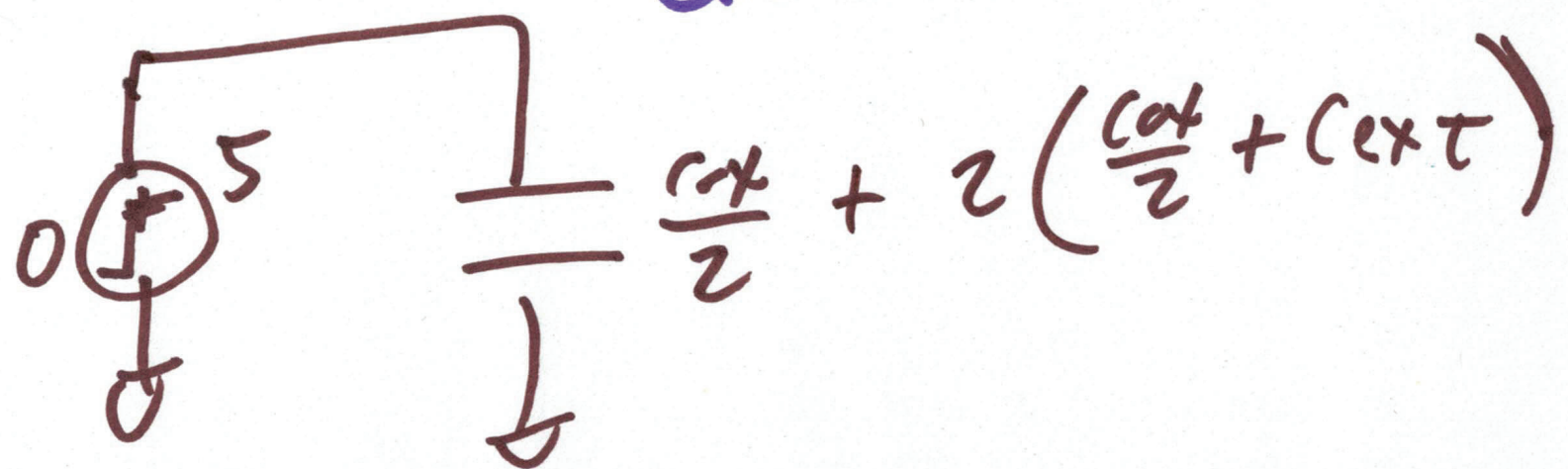
-5pC → +5pC

Δ 10pC



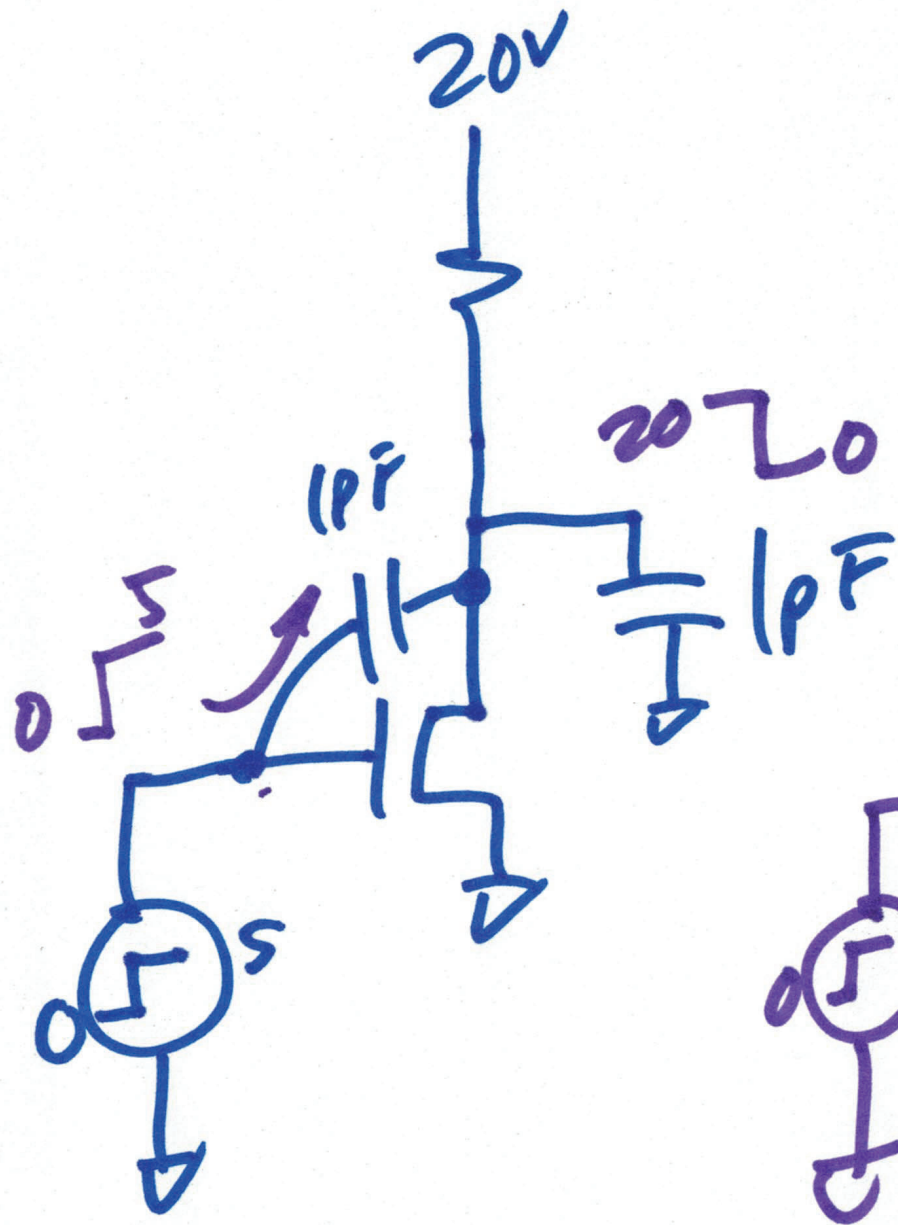


$$C_{in} = 1pF + \frac{C_{ox}}{2} + 2\left(\frac{C_{ox}}{2}\right)$$



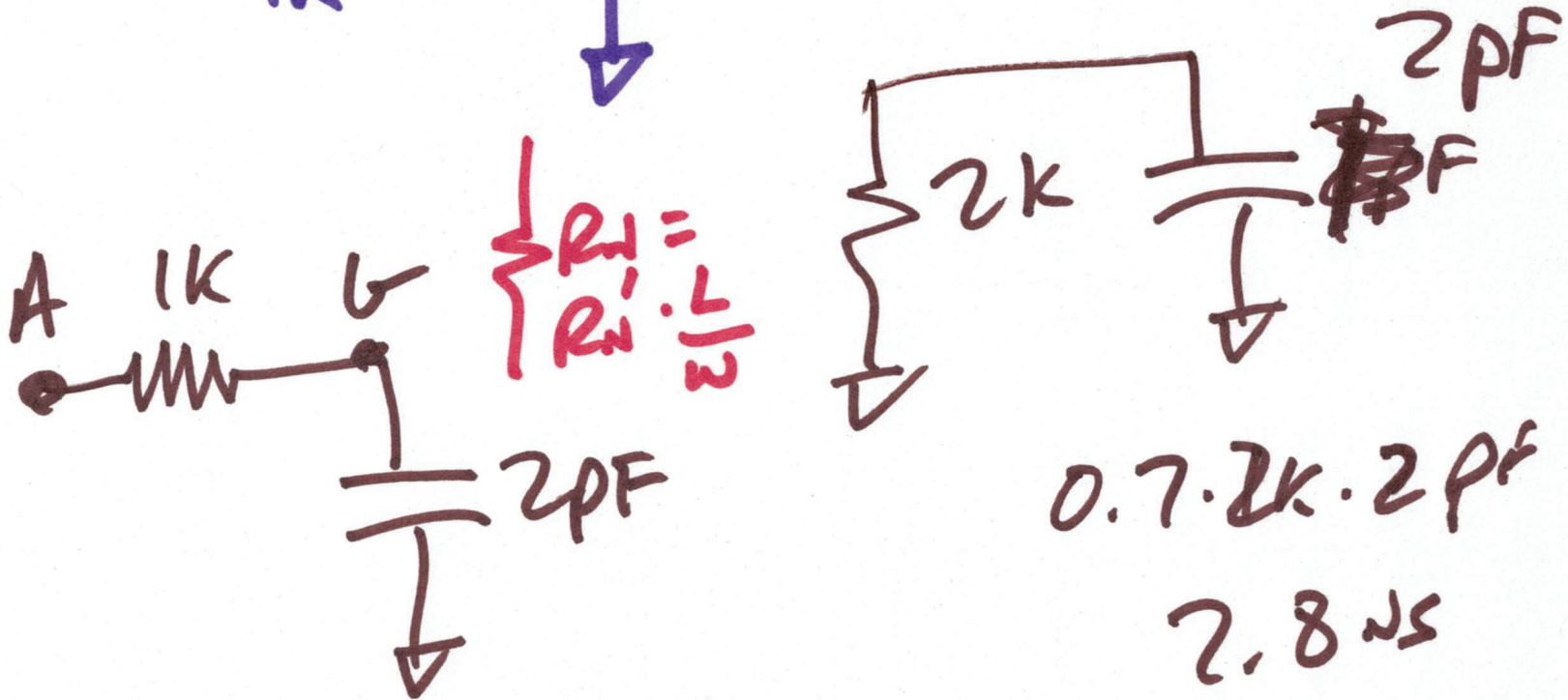
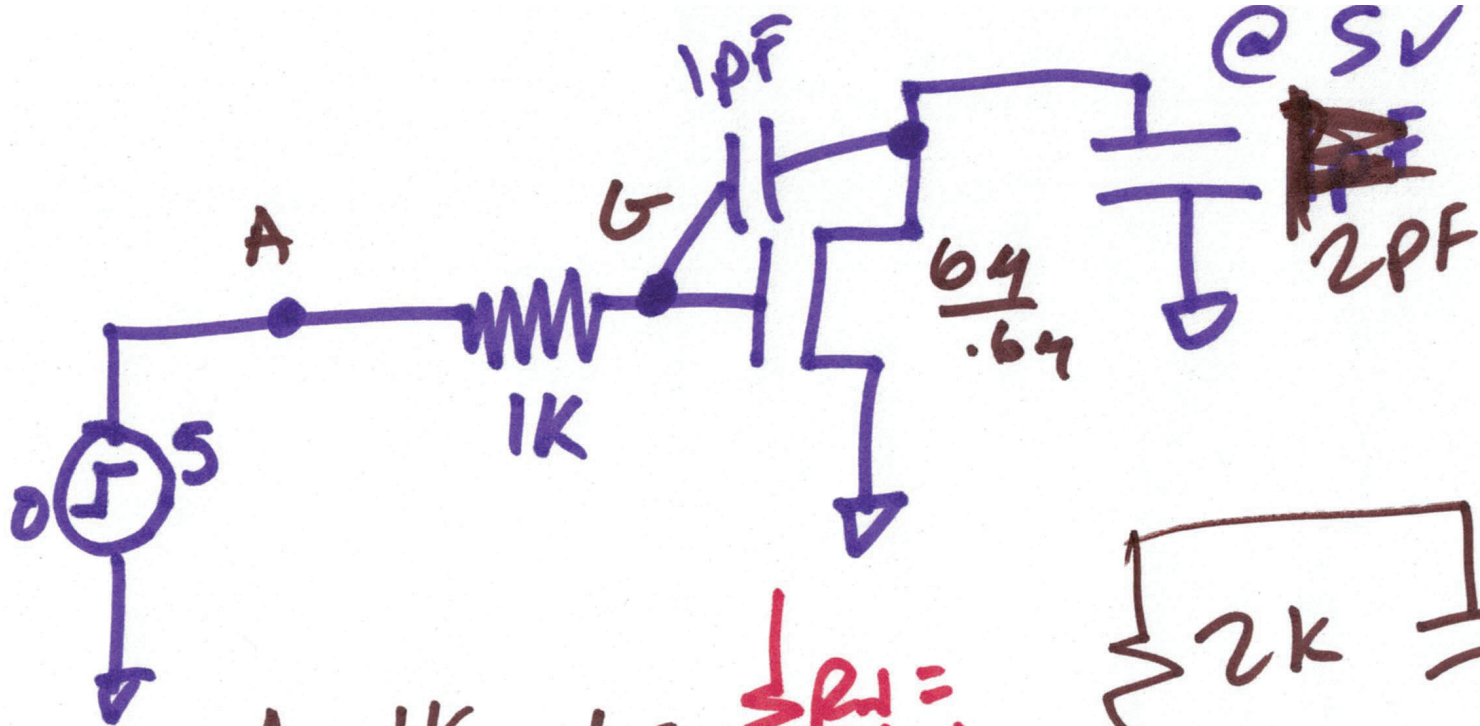
$$\frac{C_{ox}}{2} + 2\left(\frac{C_{ox}}{2} + C_{ext}\right)$$

2)



$$\frac{(20-0) - (0-5)}{1} = 25V$$

3)



$$0.7 \cdot 1K \cdot 2PF = 1.4NS$$

$$0.7 \cdot 2K \cdot 2PF = 2.8NS$$

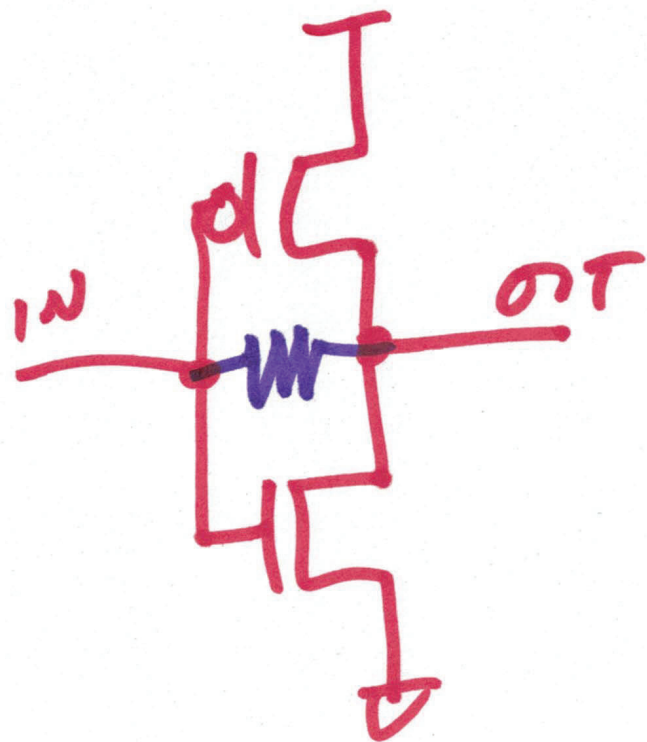
4)

$$I_{pA} = \bar{I} = \frac{Q}{dt} \frac{dV}{dt}$$

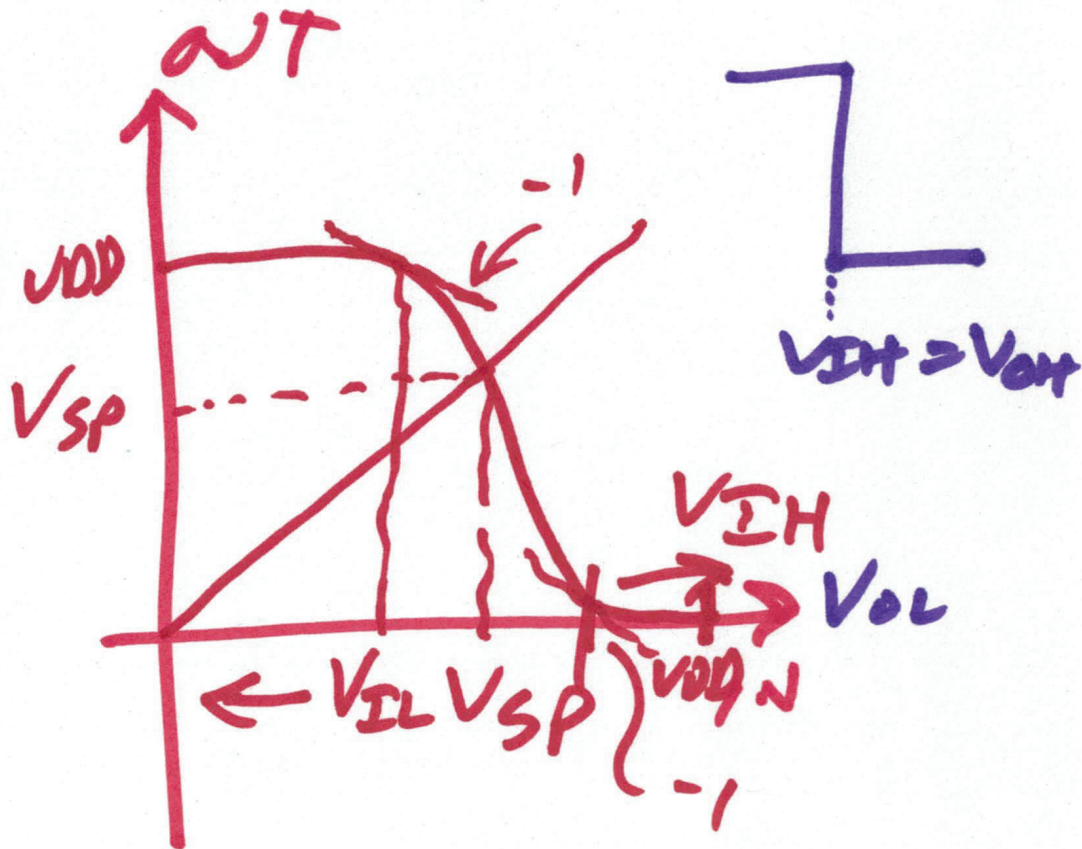
I_{pF}

$$50pA = \bar{I} = C \cdot \frac{0.1}{0.1}$$

$$C = 50pF$$



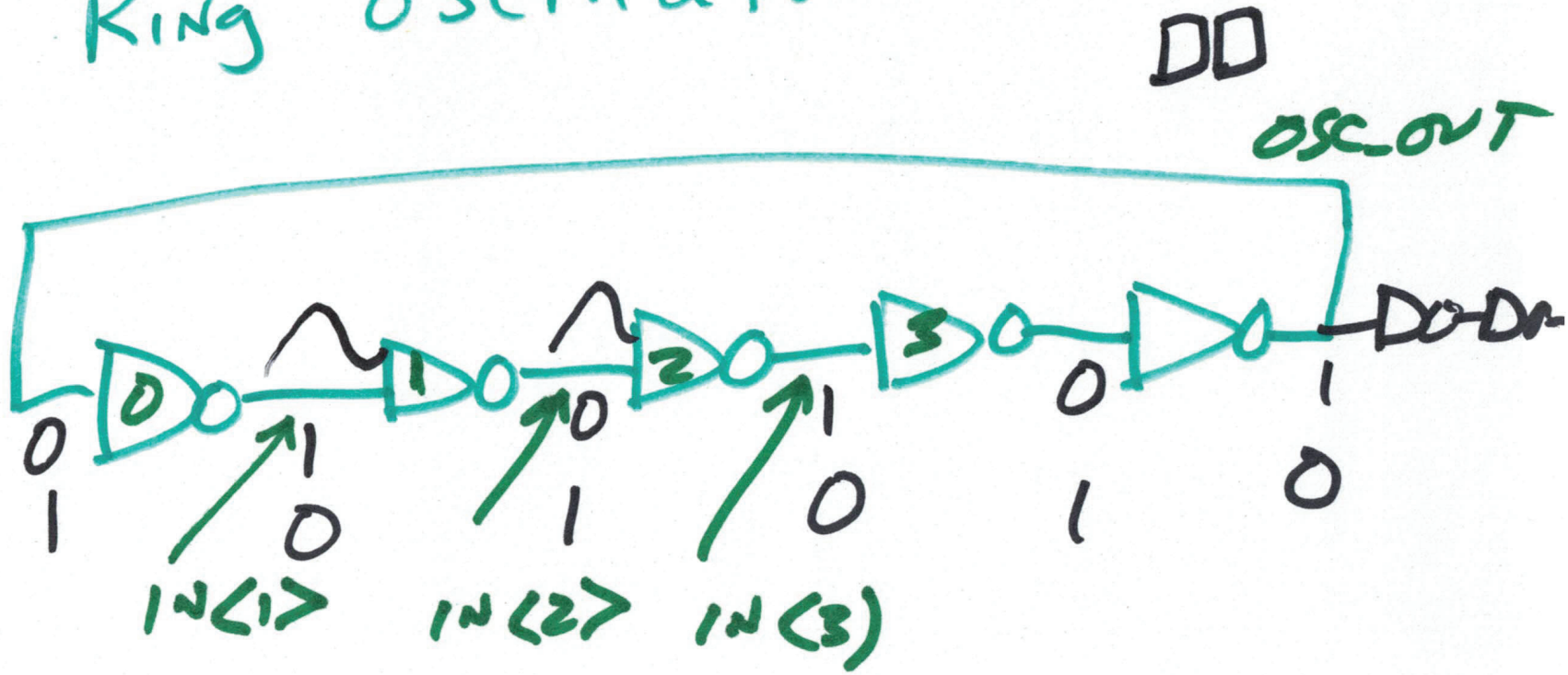
74HC04



$$NMH = V_{OH} - V_{IH}$$

$$NML = V_{IL} - V_{OL}$$

Ring oscillator



8)