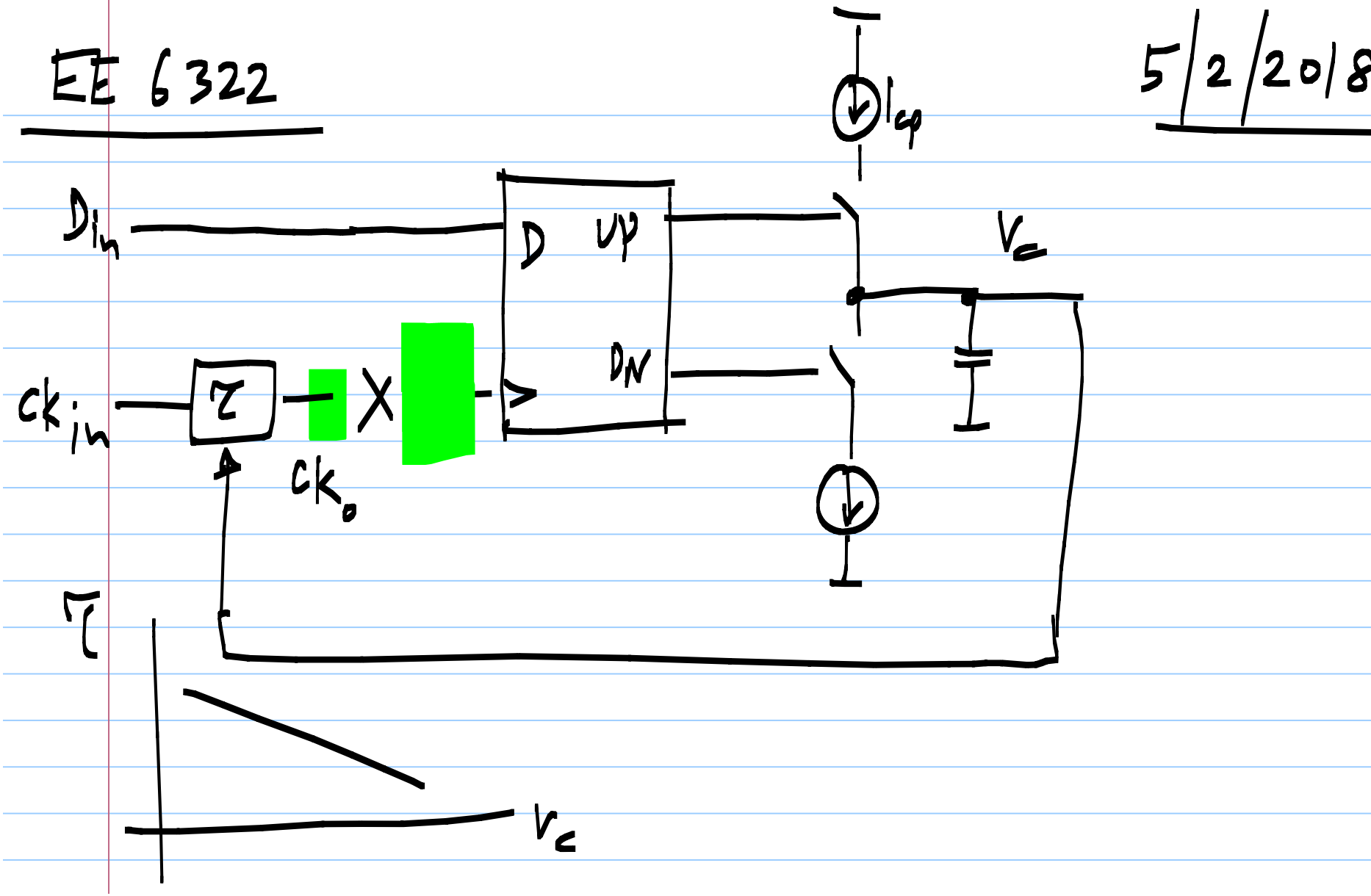
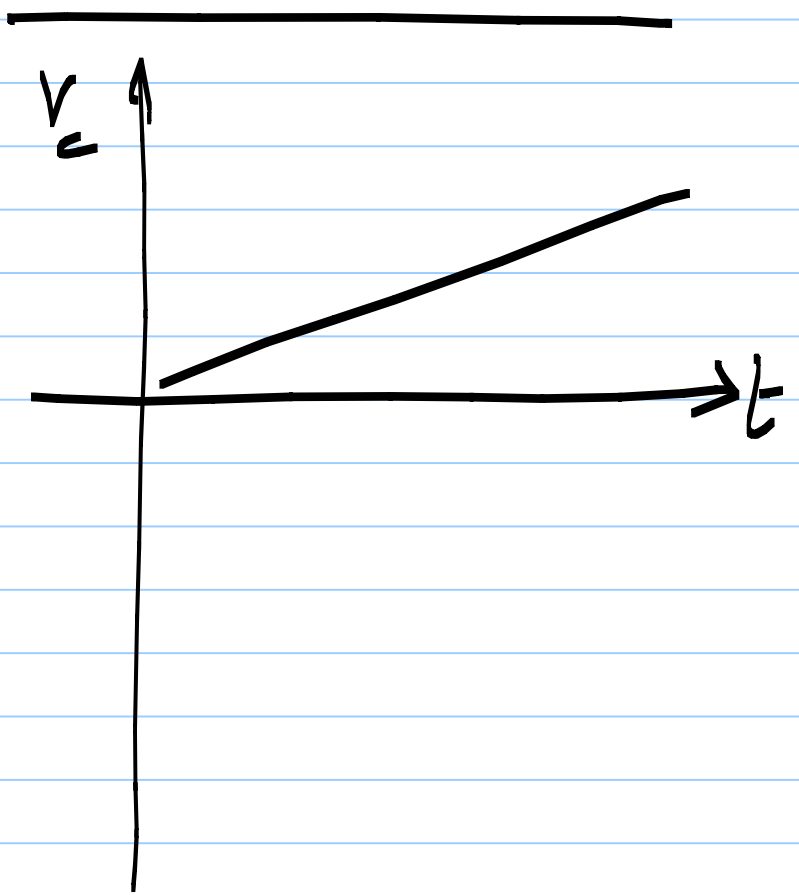
EE 6322

5/2/2018

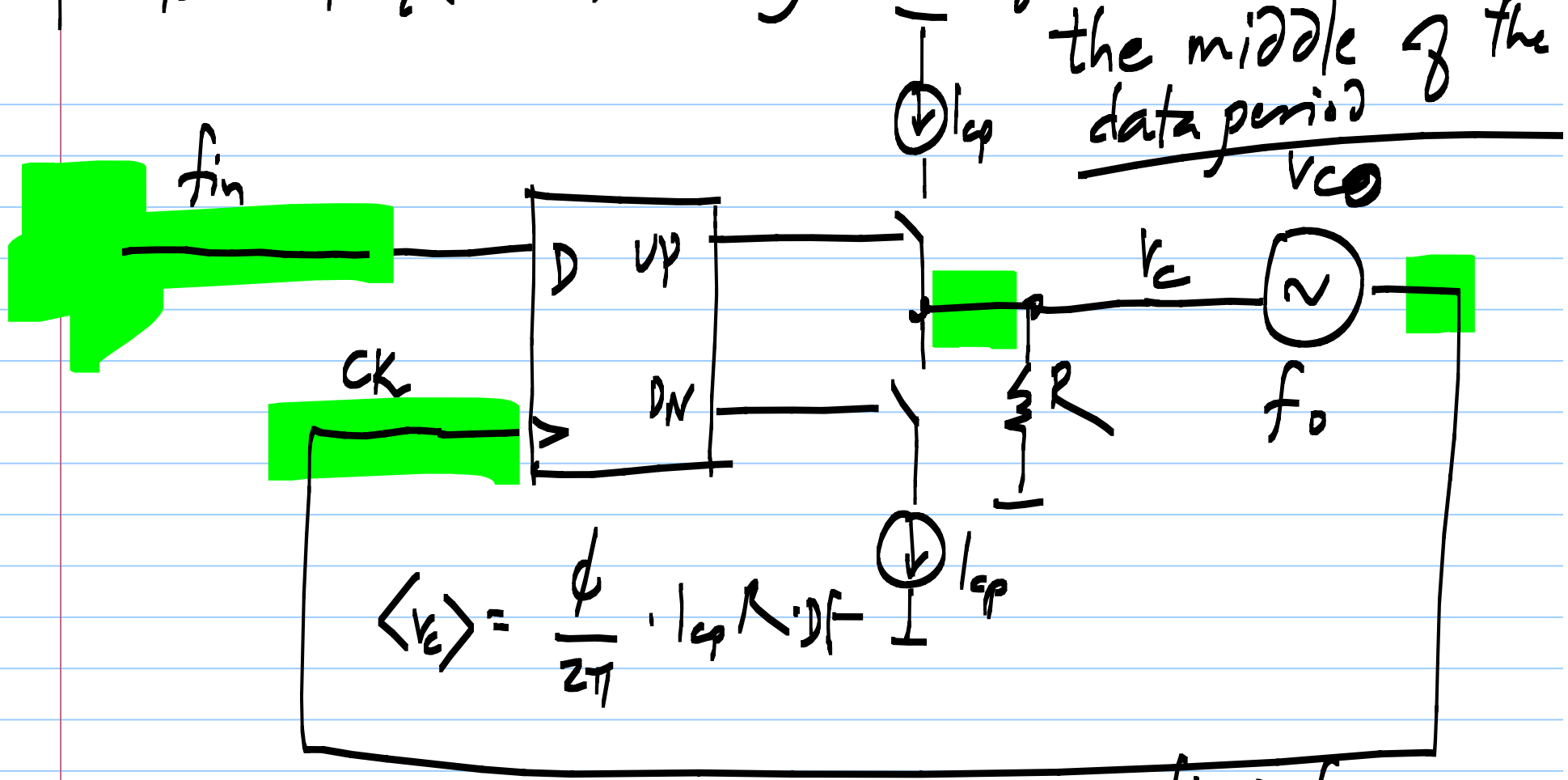


Phase diff ck_o & ck_{in}

ck_o is @ higher freq. than ck_{in}



If $f_o = \text{freq}(D_{in})$, rising edge of CK will settle to the middle of the data period



$$\langle V_c \rangle = \frac{\phi}{2\pi} \cdot I_{cp} R \cdot DF$$

$$f_o + K_{VCO} \langle V_c \rangle = f_{in} \qquad \langle V_c \rangle = \frac{f_{in} - f_o}{K_{VCO}}$$

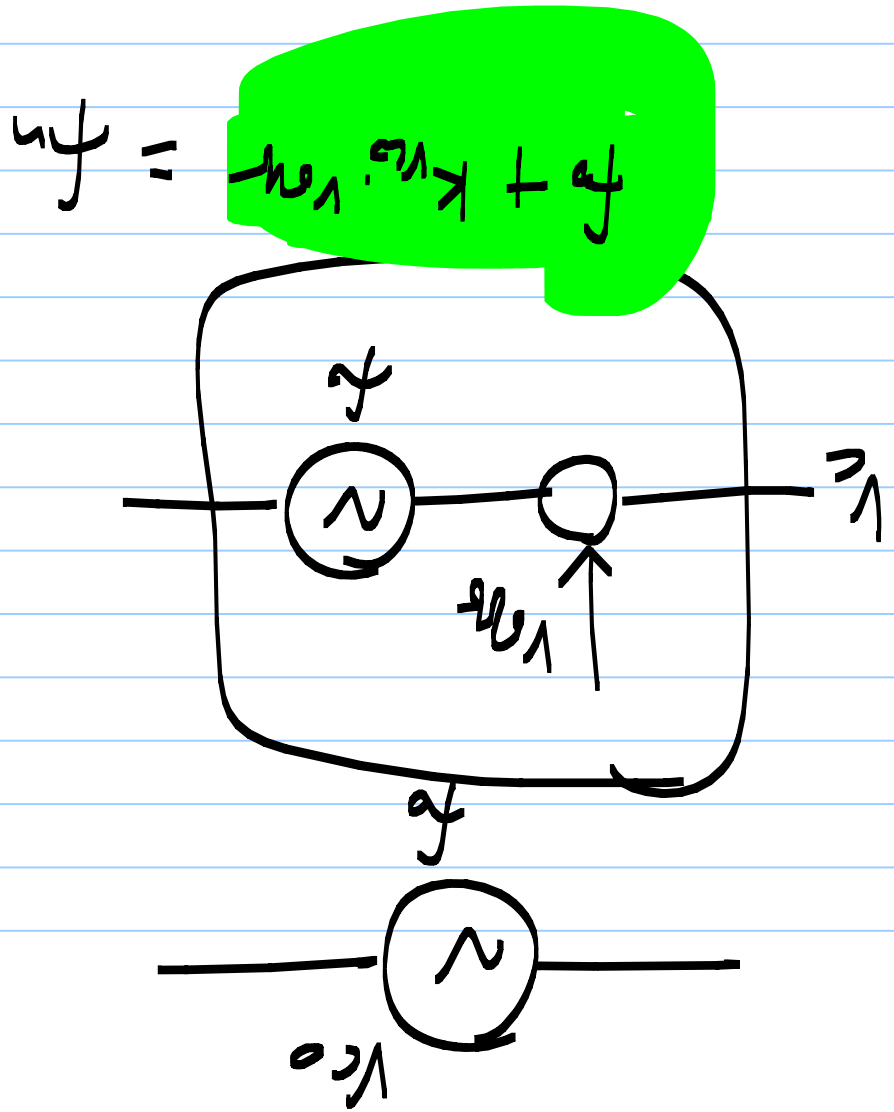
ϕ_1
ϕ_2
V_{in}
V_1
V_2
V_3
V_4
V_5
V_6
V_7
V_8
V_9
V_{10}
V_{11}
V_{12}
V_{13}
V_{14}
V_{15}
V_{16}
V_{17}
V_{18}
V_{19}
V_{20}
V_{21}
V_{22}
V_{23}
V_{24}
V_{25}
V_{26}
V_{27}
V_{28}
V_{29}
V_{30}
V_{31}
V_{32}
V_{33}
V_{34}
V_{35}
V_{36}
V_{37}
V_{38}
V_{39}
V_{40}
V_{41}
V_{42}
V_{43}
V_{44}
V_{45}
V_{46}
V_{47}
V_{48}
V_{49}

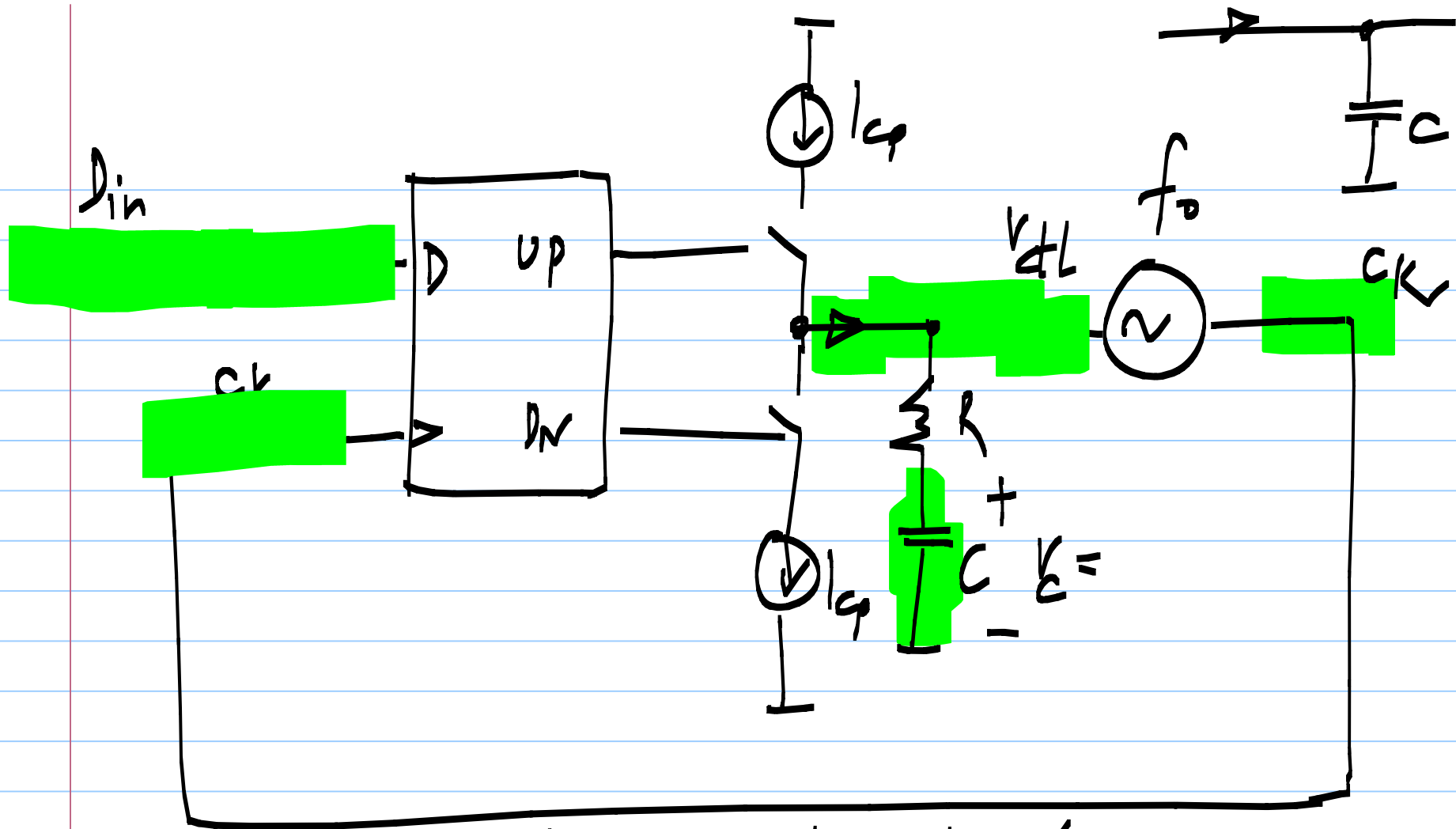
If $f_0 \neq f_{REF}$ (Din)

* In steady state, $f_{out,VCO} = f_{REF}(D_{in})$

$\Rightarrow \quad V_c \neq 0$

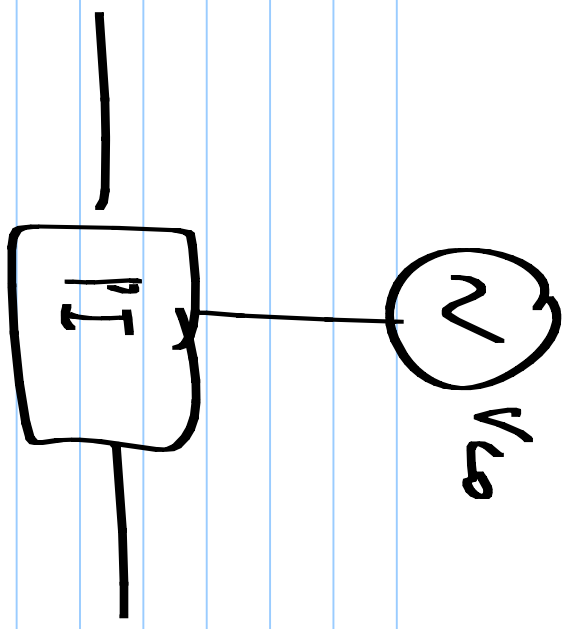
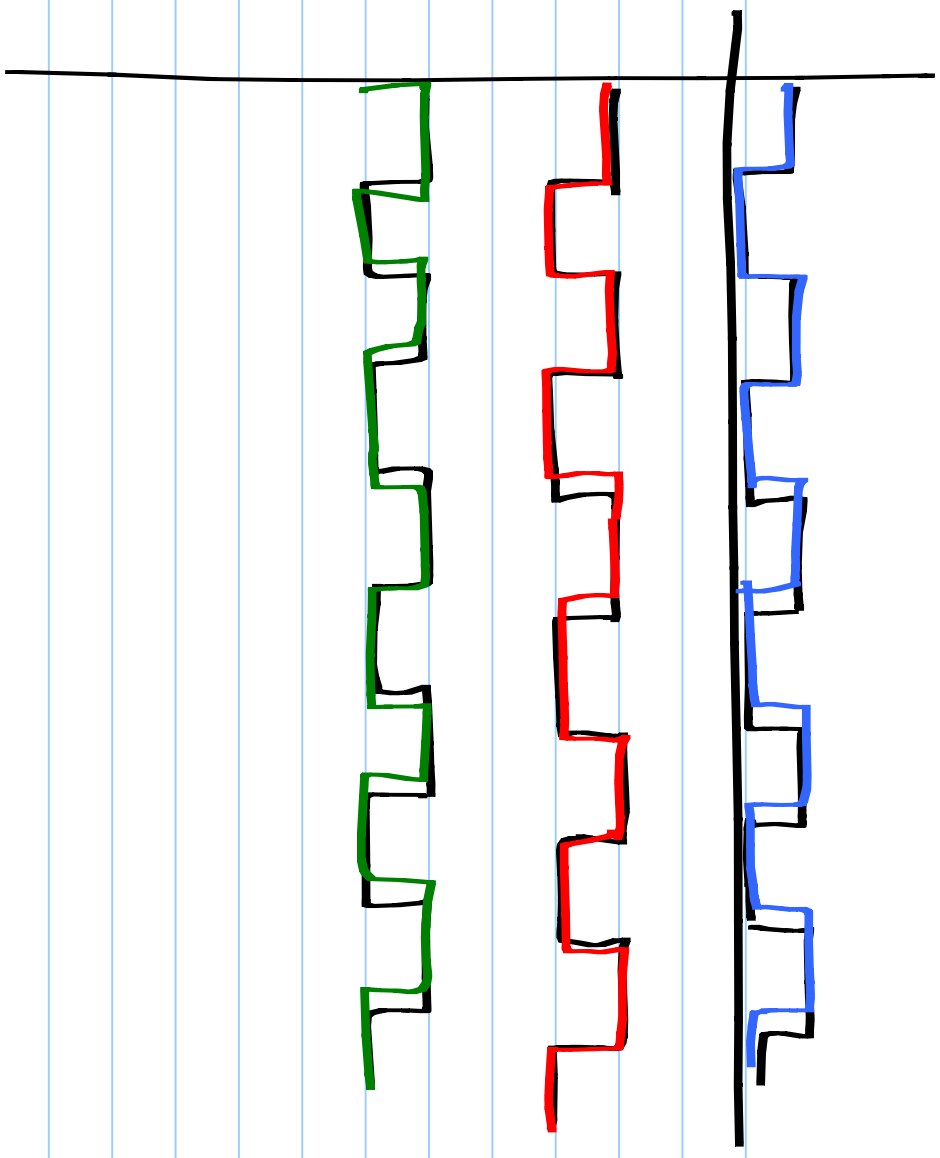
$\Rightarrow$ Non-zero phase difference between CK & D_{in}





$f_{in} > f_o$ → initially settle with $\langle V_{ctl} \rangle > 0$

finally $f_o + k_{vco} \cdot V_c = f_{in}$ $\langle V_2 \rangle = 0$


T
2