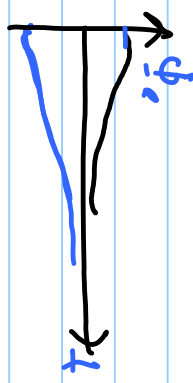
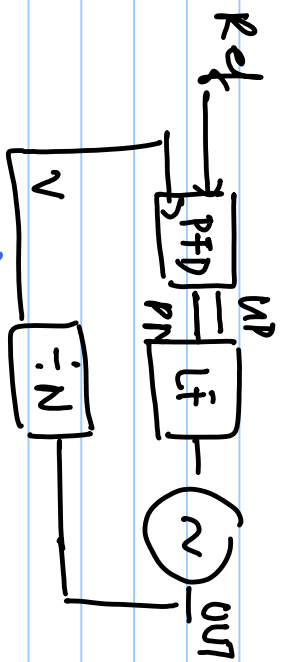
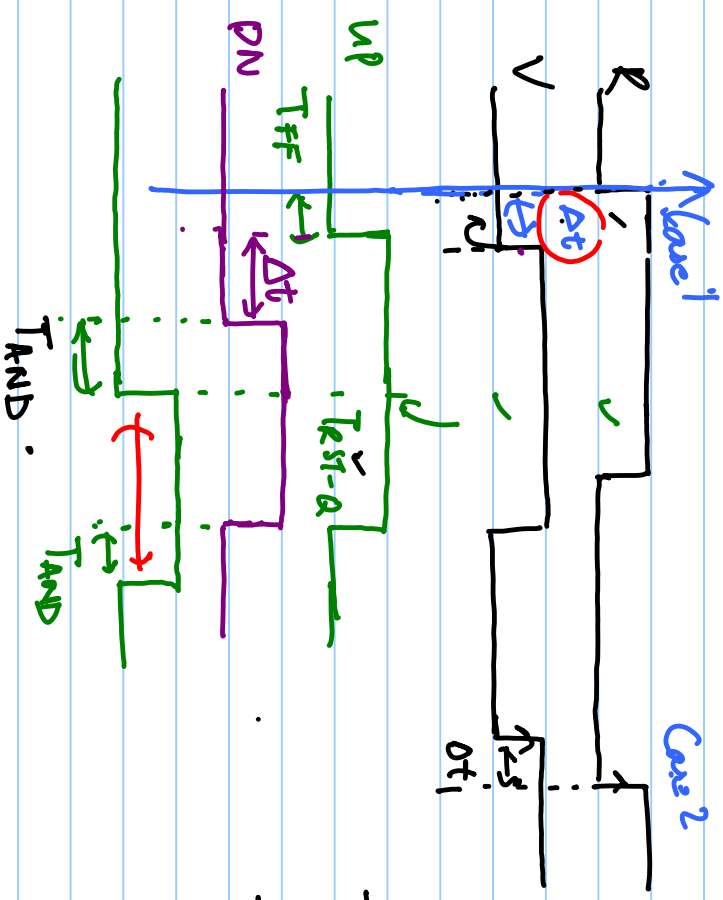
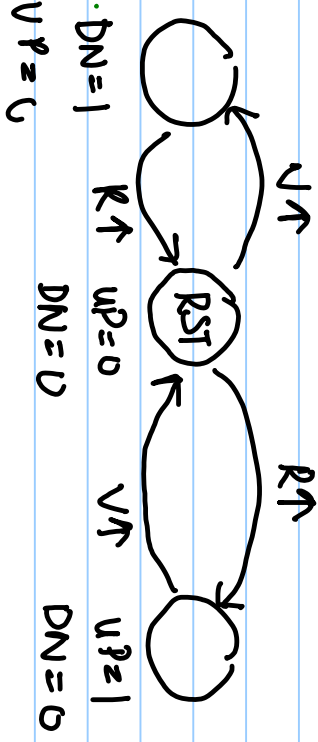
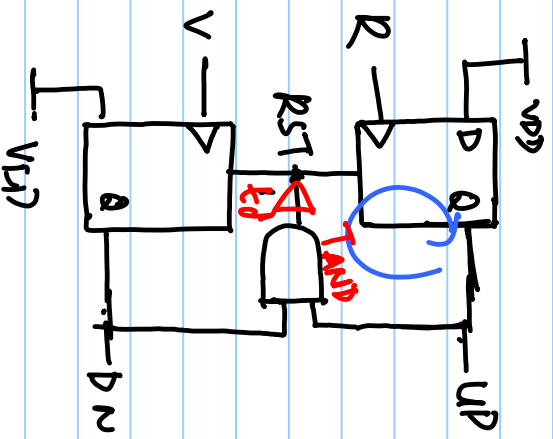


Lecture # 35

Phase Frequency Detector (PFD)

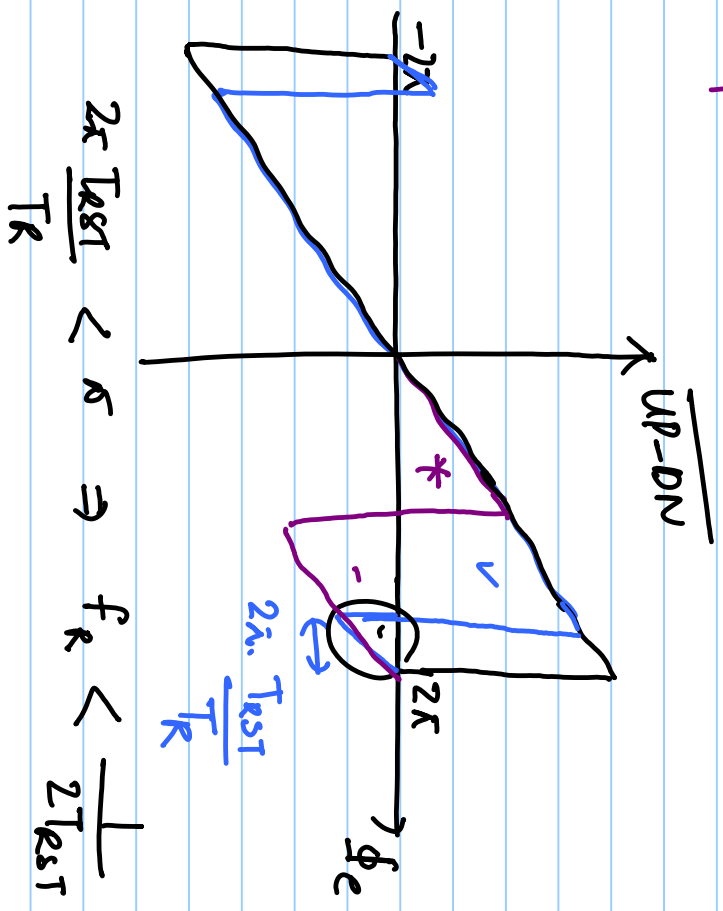
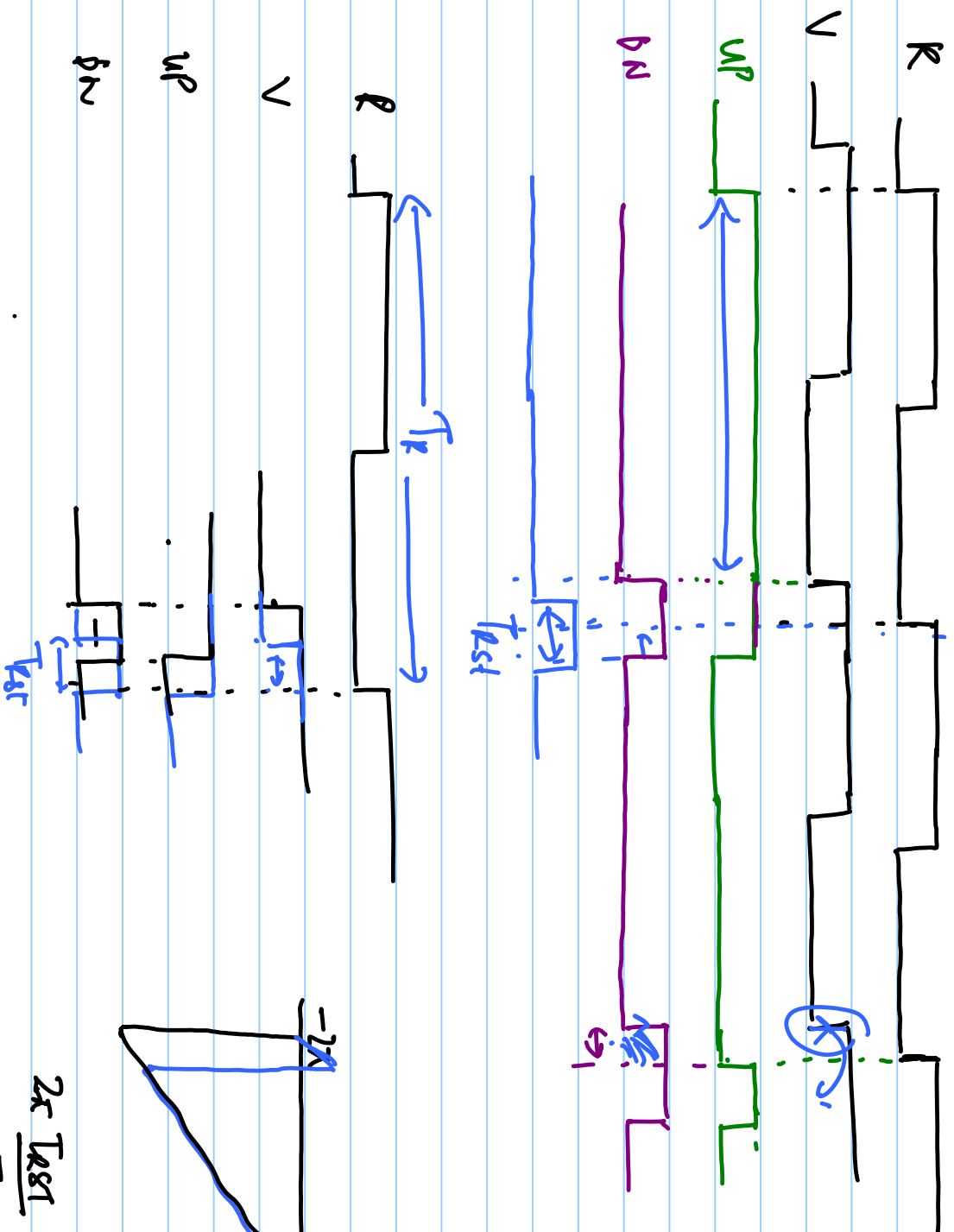


$$\dot{\phi}_e = 2\pi \cdot \frac{\Delta t}{T_{r,q}}$$

$$T_{RST} = T_{RST-Q} + T_{AND} + t_d$$

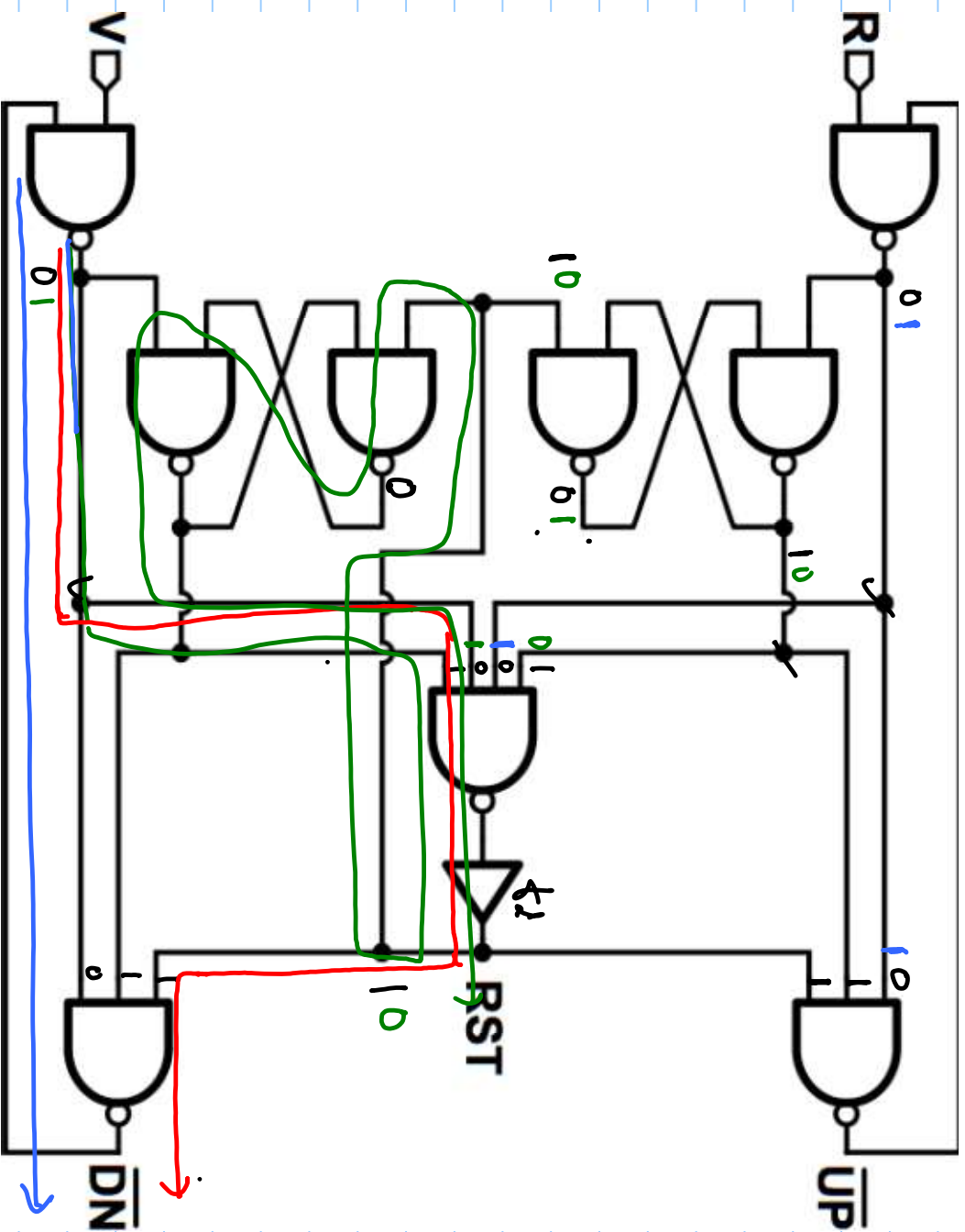
$$T_{LOW} = T_{RST-Q} + T_{AND} + t_d$$

$\Delta f > 3$



$$2\pi \frac{T_{rst}}{T_r} < \pi \Rightarrow f_r < \frac{1}{2T_{rst}}$$

NAND - PFD



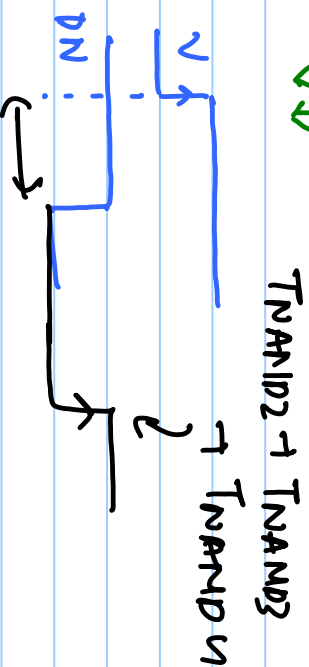
Reset state

$$\overline{UP} = 1, \overline{DN} = 1$$

$$R = V = 1, RST = 1$$

$R \downarrow$

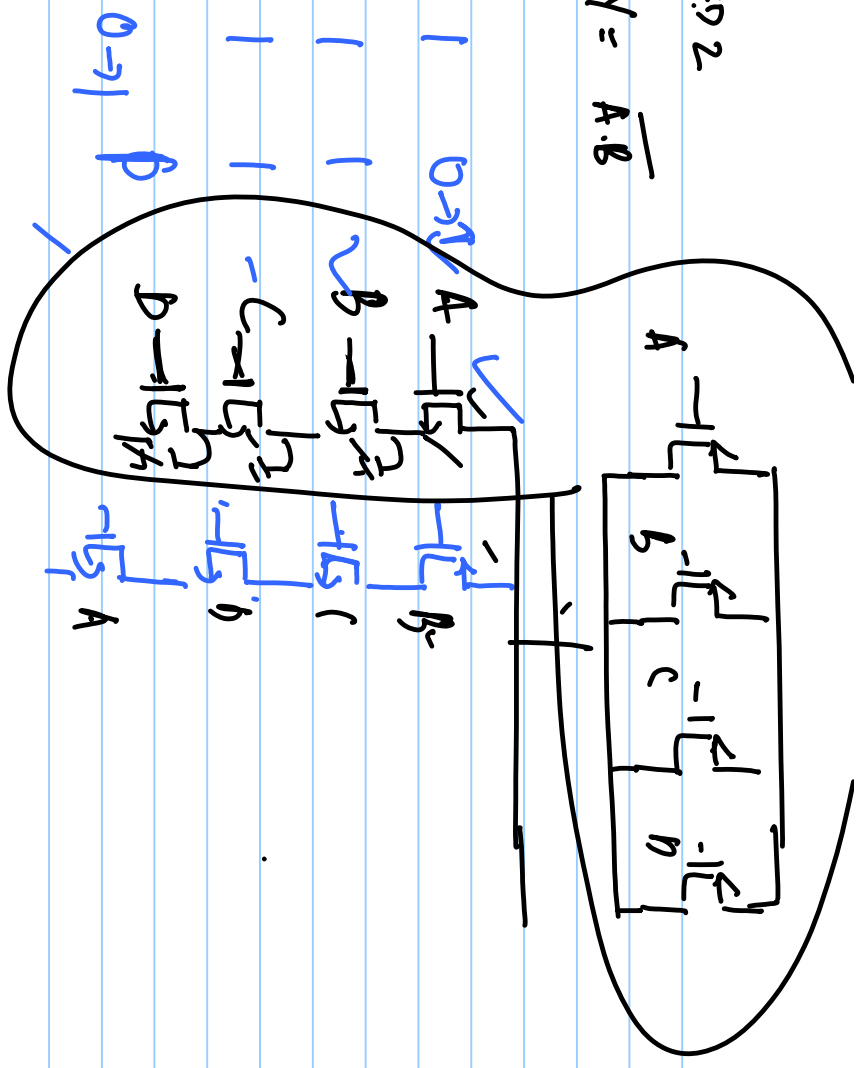
$V \downarrow$



$$T_{OV} = T_{NAND4} + t_{fd}$$

NAND 2

$$Y = A \cdot \overline{B}$$



x x x x