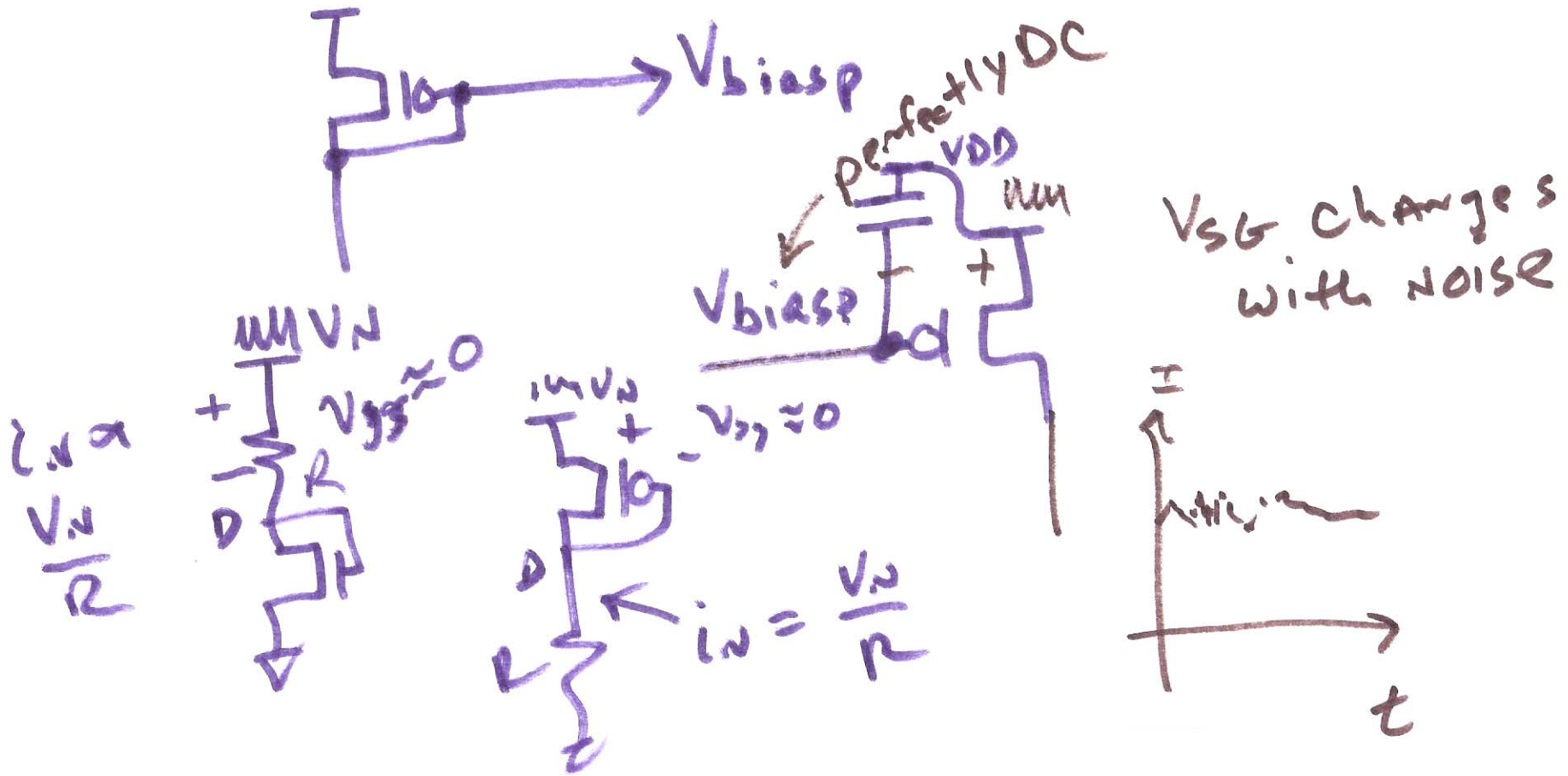
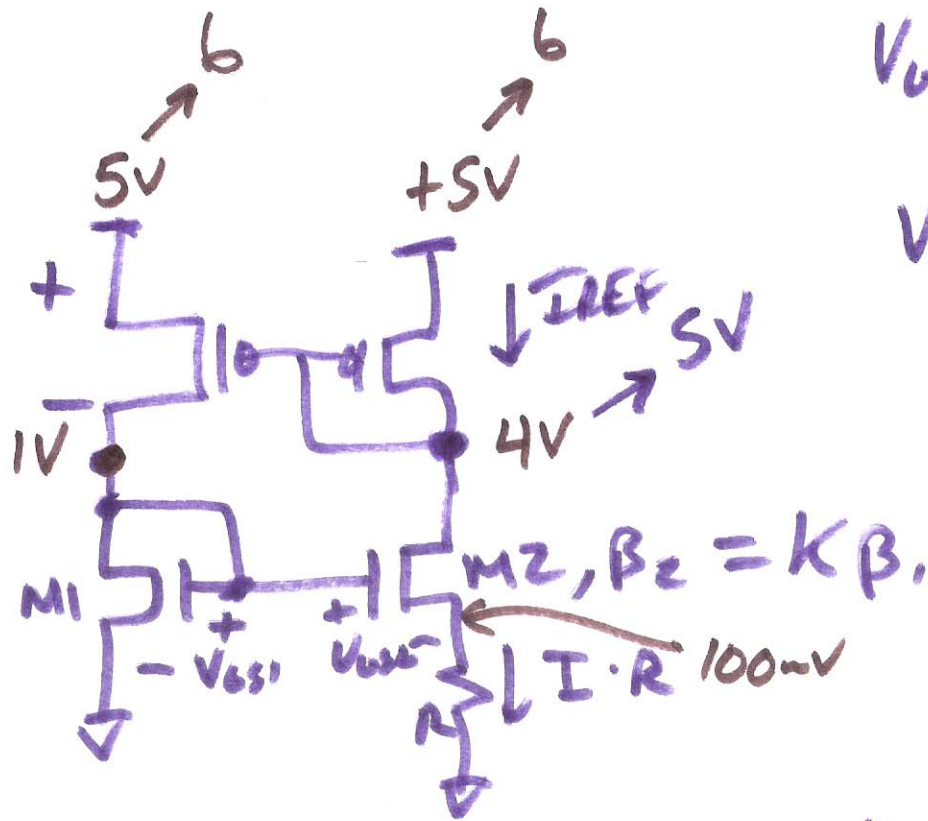


EE 420 / ECG 620

Lecture 5

2/10/14





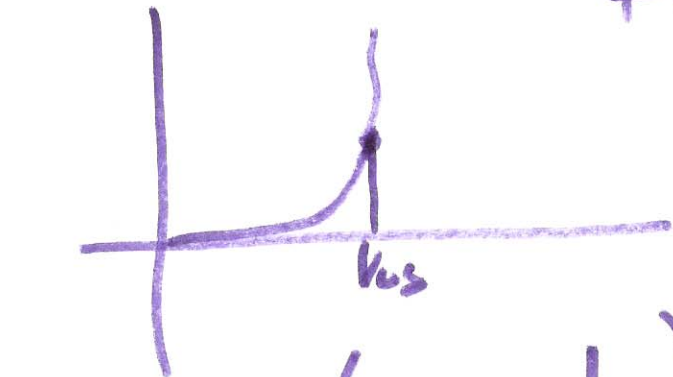
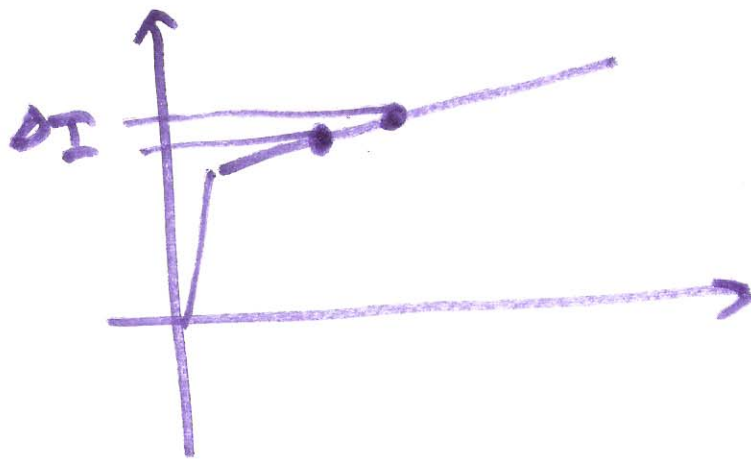
$$V_{gs1} = V_{gs2} + I \cdot R$$

$$V_{gs} = \sqrt{\frac{2I_{REF}}{\beta}} + V_{TH}$$

$$\sqrt{\frac{2I_{REF}}{\beta_1}} + V_{TH} =$$

$$\sqrt{\frac{2I_{REF}}{K\beta_1}} + V_{TH}$$

$$+ I_{REF} R$$



$$\sqrt{\frac{2I_{REF}}{\beta_1}} \left(1 - \frac{1}{\sqrt{K}} \right) = I_{REF} R$$

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$$\left(1 - \frac{1}{\sqrt{k}}\right) \sqrt{\frac{2}{\beta \cdot R^2}} = \sqrt{I_{REF}}$$

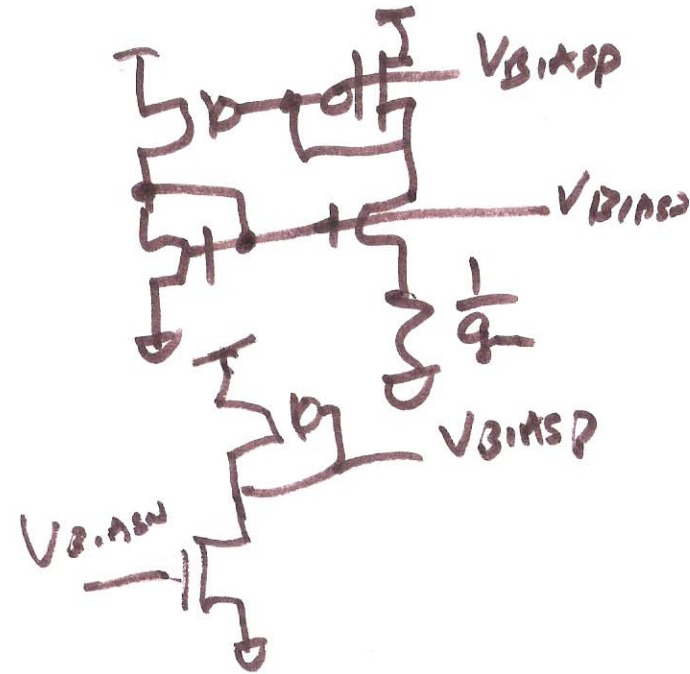
$$I_{REF} = \frac{2}{\beta \cdot R^2} \left(1 - \frac{1}{\sqrt{k}}\right)^2$$

$$g_m = \sqrt{2\beta I_{REF}} = \beta(V_{GS} - V_{TH})$$

$$g_m = \frac{2}{R} \left(1 - \frac{1}{\sqrt{k}}\right)$$

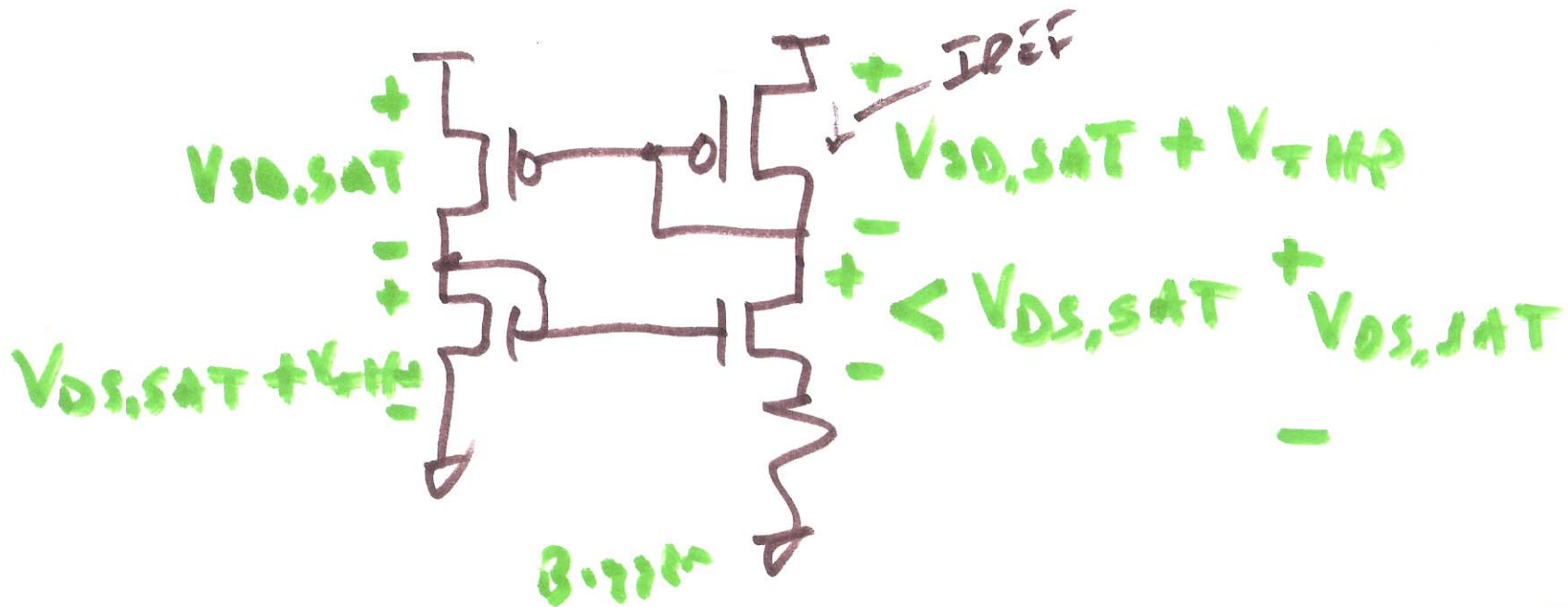
$$k = 4$$

$$g_m = \frac{1}{R}$$



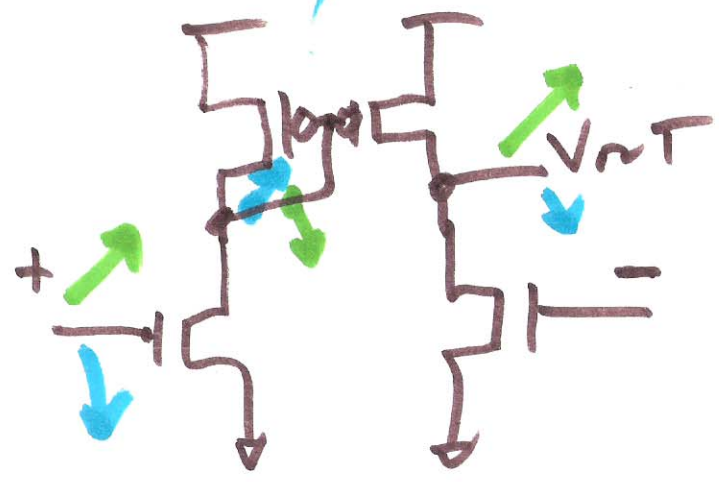
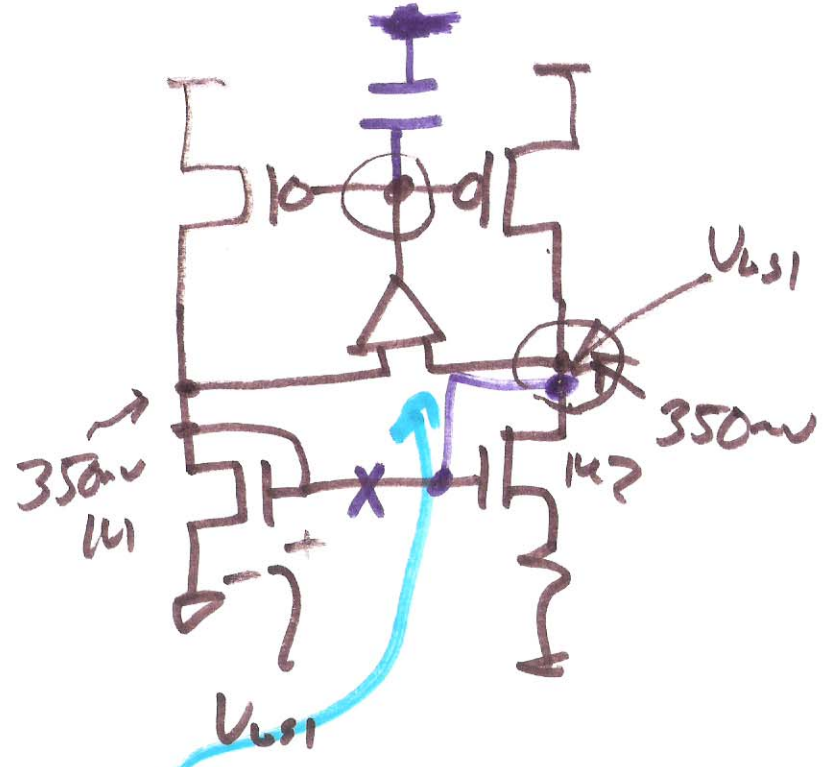
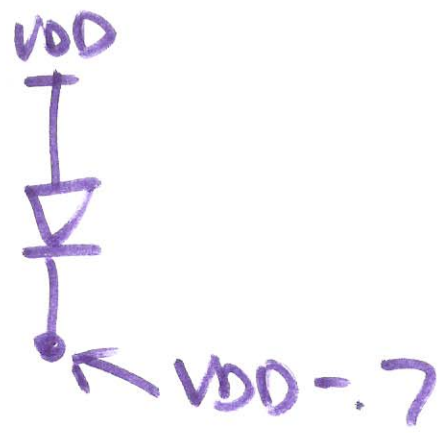
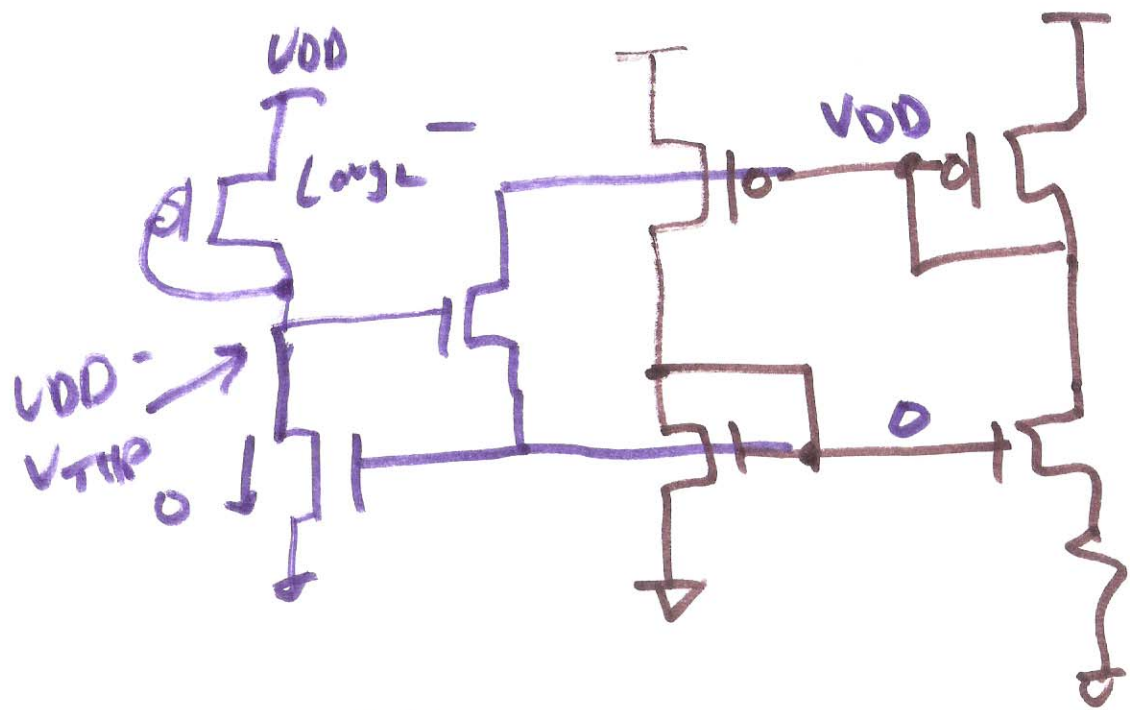
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Minimum VDD? in terms of $V_{SD,SAT}$, V_{THP} , $V_{DS,SAT}$, V_{THN}

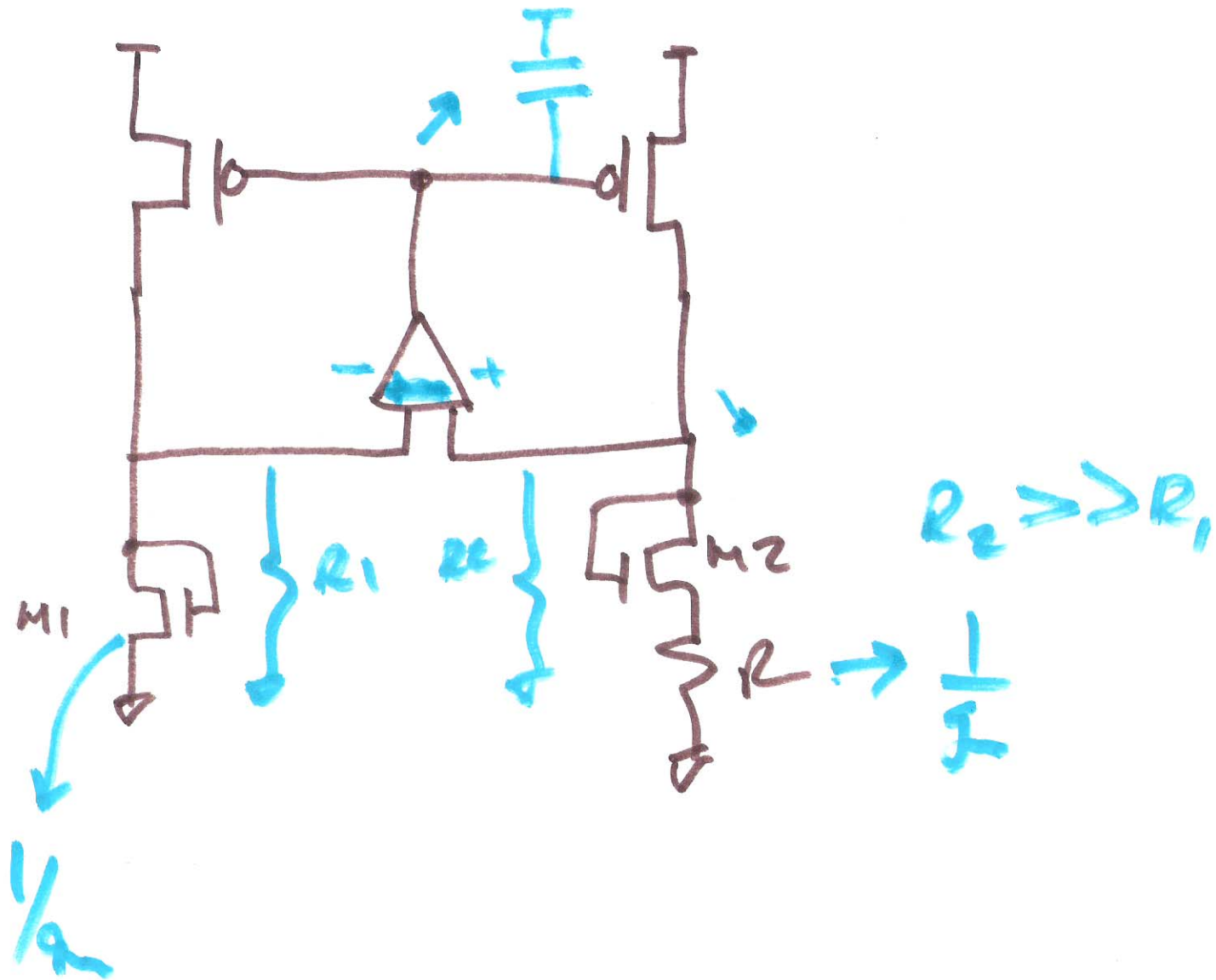


$V_{DDmin} =$
 $V_{SD,SAT} + V_{DS,SAT} + V_{THN}$
 $V_{SD,SAT} + V_{DS,SAT} + V_{THP}$

$P = 2I_{REF} \cdot V_{DD}$



5)



6)

